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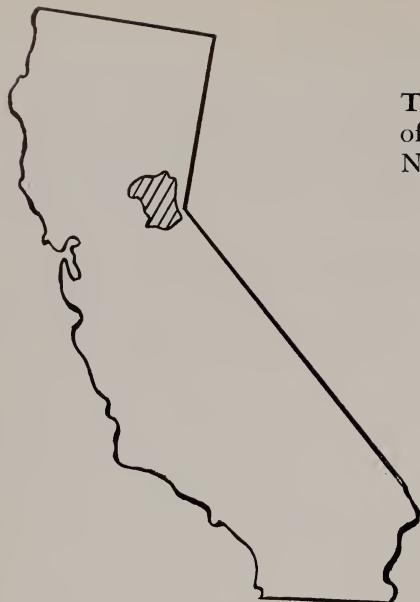
TIMBER MARKETING AND LAND OWNERSHIP IN THE CENTRAL SIERRA NEVADA REGION

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The Central Sierra Nevada Region, consisting of the greater part of El Dorado, Placer, and Nevada counties

is rich in commercial forests—1,248,000 acres, or 66 per cent of its total area;

has almost half of its commercial forest resources in private holdings—more than 6,000 private land owners hold nearly one million acres of land, two-thirds of which is commercial forest land suitable for growing timber;

has a high proportion of small holdings—two-thirds of the private commercial forest area is in properties under 5,000 acres.

Annual lumber production jumped from 188 million board feet in 1945 to 327 million board feet in 1946, has remained high since, reaching a peak of 376 million board feet in 1956—6.5 per cent of the total state production.

The increased demand for timber

made the small forest owner a major source of timber supply, although he has little experience or interest in timber marketing and his main interests commonly lie elsewhere;

expanded marketing opportunities—although the number of mills dropped after 1946, increases in output and the number of timber operators created better markets for sellers;

increased the need for efficient timber marketing—with much of the region's forests under control separate from that of the utilization plant, operators had to buy needed timber from the land owners.

At first

everyone seemed to prosper.

small-forest owners had “windfalls” selling timber.

mill and timber operators found an available supply of timber on these small ownerships.

But then

major imperfections in timber marketing became apparent, detrimental to sellers, buyers, and the region as a whole.

faulty marketing practices led to dissatisfaction with timber selling, timber-property damage, withdrawal of holdings from the market, and underestimation of the possibilities of planned forest management on small woodlands.

This study examines the marketing of stumps and logs from privately owned, small forest properties in the Central Sierra Nevada Region. It brings together information essential to planning for a sound, permanent forest economy for the benefit of the forest industries as well as of the forest owners. It offers basic information; evaluates the effectiveness of present marketing procedures; points out weaknesses; and offers suggestions as to how to overcome them.

Specifically, the report examines several important questions pertaining to the region:

What is the current land and forest ownership pattern and its significance to marketing?

What is the present timber-marketing pattern?

Are markets operating efficiently to assure the forest industries of a continuous supply of timber?

Are returns from forest holdings encouraging purposeful management for the production of timber?

Readers will find the summary and evaluation of the findings on pages 5 to 9.

Owners of small timber properties and loggers and millmen who obtain stumps and logs from such properties will find details of marketing practices on pages 30 to 55.

All those interested in the relationship of marketing and land ownership to economic development and forest policies, particularly as they concern small forest properties, will find in this bulletin basic data about the forest industries of the region, the pattern of land ownership, and the marketing system for standing timber from the small forest holdings.

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TIMBER MARKETING and LAND OWNERSHIP in the CENTRAL SIERRA NEVADA REGION¹

DENNIS TEEGUARDEN • PAUL CASAMAJOR • JOHN ZIVNUSKA

THE FINDINGS

The forest economy of the Central Sierra Nevada Region has undergone significant changes since the end of World War II. Output of forest products, principally lumber, has increased at a moderate pace following a boom in 1946; employment in the timber industries has grown substantially; and today forest-based industrial activity is more important to the regional economy than at any time in the past.

These gains in forest-products output have been partly based on ownerships of less than 5,000 acres which constitute one-third of the region's commercial forest land and two-thirds of the privately owned commercial forest land. The output increases have resulted in expanded opportunities for marketing timber from these small-forest ownerships. On the other hand, the number of sawmills has steadily declined since 1946. And a major problem lies in the disorganization and inadequacy of marketing practices and institutions for the sale of standing timber.

Timber sales between forest owners and timber buyers are developed separately and on highly individualized bases. Competitive bidding is not practiced and

even sales on the "highest offer" received are rarely made. The methods of finding and selecting a buyer and determining the price depend heavily on the seller's familiarity with the buyer side of the market. Because of intermittent sales and other factors, many forest owners lack this knowledge. Sales are carried out very informally, considering the difficult legal and forestry problems connected with marketing standing timber. The apparent satisfaction of owners with their arrangements seems to lie not in the adequacy of the arrangements but in a general lack of interest and knowledge of forestry possibilities and timber marketing. To some extent this is due to limited types of markets. At the moment the sole market available to most forest owners is that for sawlogs; the possibilities for marketing thinnings and smaller material are extremely limited. These limited markets, combined with geographic and transportation factors, restrict marketing activity and opportunity.

The marketing process does not include stages with a high enough degree of concentration to bring the forces of supply and demand into focus; there exist no centers of information where buyers or sellers can learn about timber availabil-

¹ Submitted for publication August 1959.

ity or mill requirements. There is not even a clearly defined and uniformly applied unit for the measurement of the physical quantity of the timber bought or sold.

The traditional estimating and scaling practices of the lumber industry may be adequate for transactions between experienced traders, but small-forest owners do not realize the importance of the details of these methods. This puts them in an unfavorable position in timber sales and obscures the price actually received per unit of volume sold.

The main weakness in marketing practices lies in the seller's ready acceptance of a passive role. Sellers do not realize the complex nature of timber sales; they are reluctant to participate with time and money in the various requirements of a successful sale. Timber sales usually give the buyer the cutting rights because the owner is unable to do the logging himself. But standing timber is not a standardized good separate from the property to be sold at the side of the road or in an organized market place. Instead, each property has its distinctive features affecting values and marketing possibilities, while the fixed nature of forest stands requires that the purchasers have the right to enter the seller's lands to cut and remove the trees. This directly affects the residual values. A successful sale requires an informed and active seller who can provide for the detailed administration and supervision of all procedures related to the sale.

An informed seller should possess knowledge of methods of selling, available markets, and prices. However, the study showed that inefficient sales practices often were used where better alternatives were available. In some cases owners did not use good marketing practices because they did not know about them; in other cases owners evidently considered the returns from selling insufficient to justify greater efforts.

Over four-fifths of the sellers claimed

knowledge of current prices. On this basis lack of such information does not appear to be a problem. However, there is doubt that such price information as "the going rate" and "what others were getting" is of much use in adequately reflecting the values at stake in individual sales. There is need for information which, when used in combination with price-determining factors, can be applied to establishing the market price for timber on any single property.

Accurate and meaningful price reporting for standing timber does not appear to be feasible under the conditions prevailing in the region. The detailed and time-consuming field interviews of this study did not produce data adequate for the appraisal of price levels for individual properties or for the isolation of price-determining factors, except to the extent that gross correlations were found between prices and certain marketing practices. A fundamental difficulty in price reporting is the lack of precise and fully defined information as to price received by the sellers. Often the price or other important sale details could not be recalled by sellers. One-fifth of the sales were on a lump-sum basis, which automatically makes the significance of any data on price per thousand highly questionable. In the remaining sales on a scaled-volume basis, variations in scaling practice, frequently unknown, substantially reduce the reliability of price data. In a number of cases the sale was based not only on cash payment for the timber but also on the supplemental services such as road building, the value of which cannot readily be determined. The timber itself ranges from residual old-growth Douglas-fir or incense-cedar to second-growth ponderosa pine, and varies widely in costs of logging and log quality. To these differences must be added variations in terms of sale such as length of cutting rights, liability for taxes, responsibility for slash removal, and similar matters, all of which must

be defined to give precise meaning to quoted prices.

The quoted price for standing timber, therefore, is not as clear an indicator of the success of a sale as is true in many other areas of economic activity. Price is only one of several factors determining the actual return to the seller. Accurate determination of the volume cut also has a great effect on the gross cash income from the sale, while the condition of the residual stand and damage to roads, fences, and other improvements may often be the dominant factor in determining the net benefits received. The seller's complaints usually centered on cutting and logging practices, slash disposal, and failure to provide services rather than on price.

Far-reaching consequences. These weaknesses in the marketing practices affect returns to forest holdings as well as the long-range timber supply prospects of the forest industries. The region needs adequate markets and efficient marketing patterns to give owners the financial incentive to practice forestry. In evaluating the adequacy of these returns in the past, it is significant that some 123,000 acres of private commercial forest land—one-fifth of all such land—were nonstocked and held in small-forest ownerships. Thirty per cent of all commercial forest land in small ownerships was classified as nonstocked and essentially nonproducing. And the remaining lands characteristically were in a poorer productive condition than the large industrial ownerships and public forest lands. Furthermore, there is a tendency for an appreciable proportion of small-forest holdings to be withdrawn from commercial timber production. Nearly one-fourth of the owners interviewed who had salable timber during the study period would not sell timber because they believed logging would conflict with their primary purposes of ownership—mostly recreational or residential uses. These owners typically held very small areas,

but together had 10 per cent of the total forest-land area in the sample. Such withholding of lands from logging has a direct and immediate effect on timber availability, while the extensive area of nonstocked forest land has a long-range impact.

Even those small-forest owners who sold timber generally lacked interest in the income possibilities from forest land, as indicated in the passive role they played as sellers. The immediate prospects of a sale may be an important event—but beyond this there is little indication of interest in investing either time or money in even the most elementary forms of forest management. Most cutting on these properties is done on fairly crude silvicultural bases, without informed, deliberate provisions for future growth. One fifth of the sales were made to remove the forest in favor of grazing uses.

The problem of marketing is, of course, only one of several factors involved in this situation. But to the extent that marketing practices are inefficiently organized when better alternatives exist, these practices discourage the development of good forest management on small forests.

How can marketing from small woodlands be improved?

Successful timber sales can be and are being made on small-forest properties. A successful sale requires knowledge of good marketing procedures and methods. The successful seller keeps himself well informed, is careful in the selection of procedures, and remains active in the supervision of all aspects of the sale. However, the prescription of particular sales devices is not an adequate approach to timber marketing. For example, the advantages of a sale made on the basis of scaled-volume over lump-sum payments may never materialize without proper contract provisions and subsequent sales supervision. Furthermore,

in some sales in which the costs of supervised scaling are disproportionately high, a lump-sum sale based on cruised volume may be better.

To improve woodland marketing, the small-woodland owners must increase their knowledge and interest, and the forest industries must develop more stable and organized purchasing methods to facilitate the market access of the sellers whatever their state of knowledge.

Needed: well-informed owners

Increased interest and knowledge on the part of small-forest owners appears mainly as an educational process. Such education can come from public and private sources.

Public agencies, through their service programs, can play an important role in this owner education. The objectives of such programs should be to develop in forest owners an awareness and interest in forestry and marketing, and to provide necessary detailed information as a basis for informed marketing practices. To accomplish these objectives, the chief tool used should be a broad educational influence aimed at large groups of owners rather than primarily at individuals. This could be done, for example, by focusing attention on demonstrations and by assisting on some individual properties which, in turn, could serve as centers of influence.

In developing and extending these programs, the pattern and stability of ownership should be kept in view. There are estimated to be more than 6,000 owners of properties of less than 5,000 acres in the region. The large number of small-forest owners coupled with the rapid turnover in ownership represents a major problem in any program of direct assistance. If maximum benefits are to result from public-service programs of this kind, the pattern of ownership should serve as a guide to effective action. For example, concentration of the program on properties larger than

180 acres would reduce the number of potential contacts to 15 per cent of the total number of small holdings, while covering 70 per cent of the total land area in such holdings. Over a period of time it is likely that improved management on these properties will directly effect the handling of smaller ownerships.

Private forestry consultants could also play an important part in providing marketing assistance and sales supervision for small-woodland owners. Over half the sales reported in the study amounted to \$2,000 or more; a third exceeded \$5,000. However, outside assistance of any kind was obtained in only one-third of the sales, while private foresters or cruisers were used in only 13 per cent of the cases. Improved handling of some of these sales would have provided an ample margin to repay the costs of such services.

Needed: stable, organized purchasing methods

Possibilities of substantial improvement in small-forest marketing directly through the owners are limited because tenure is unstable, the number of owners is large, and their main interests lie elsewhere. There is a need for action on the side of the industry; just as the buyers have been more active in the current marketing situation than the sellers, they are also the primary source from which improvements in marketing may come.

It is true, of course, that the immediate interests of buyers and sellers are in opposition. Over a short period increased profits for the one likely mean decreased earnings for the other. However, over a longer period, the development of permanent forest industries, based on wood grown on small holdings, tends to bring the interests of buyer and sellers into accord. Such permanent industries must rely on market forces to bring about the continuous supply of timber which they need from small holdings.

Opposite forces have been at work in the industry. One unfavorable element is that a substantial part of lumber manufacturing in the region has been carried on by sawmills which were short-lived. Most of these were small mills which were particularly active in obtaining timber supplies from small private forests. Over the 10-year period ending in 1956, these small mills declined in numbers by over two-thirds. During the same period the total sawmill population declined from 136 mills to 51. Hence small-forest marketing has been influenced by unstable, temporary forest operations and a marked shrinkage in the number of market outlets. With pronounced instability and the dominance of short-period interests on both the buyers' and sellers' sides of the timber market, it is not surprising that the resulting pattern has been disorganized and not conducive to long-term forest management.

Marketing improvement is likely to be achieved only through some stabilizing elements in the situation. The large population increase and related developments in land ownership in California make it more probable that such stability can come from the forest industries than from the woodland owners. To this extent, the reduction in number of sawmills—largely of small, typically temporary operations—and the shift of production to medium and large sawmills, may mark an increase in stability in the

forest industries that will favor improved marketing on small-forest ownerships.

If the development of additional permanent forest industries in the region can be encouraged, it would be in their long-term interests to improve marketing institutions and practices. This has been shown by the experience in other parts of the United States. The development of permanent forest industries has been accompanied by improved methods of measuring timber volumes, standardization of terms of sale of standing timber, encouragement by the buyer to mark timber for cutting on a silvicultural basis, and greatly improved information about the availability and interest of timber buyers. Even long-term contracts with small-forest owners are being actively developed by some of the larger companies.

What can the individual forest owner do to improve his market opportunities? He can take a more active part in the development of the sale; he can make use of the technical assistance available from public agencies and consulting foresters; and he can closely supervise all phases of the transaction.

General improvement in small-forest timber marketing does not seem likely, however, through programs which concentrate solely on the seller. Permanent and stable industries purchasing timber from small forests are requisite to general improvement in marketing.

THE FOREST ECONOMY

The Central Sierra Nevada Region, as defined in this report, includes those parts of El Dorado, Placer, and Nevada counties which lie west of the Sierra Nevada summit and east of state highway 49, except in Nevada County where the county line forms the western boundary (figure 1). This area includes the major portion of the commercial forest land in the three counties, but excludes the Lake Tahoe area where such land is predominately devoted to recreational use.

Land and forest resources

The region of the study is a mountainous area, totaling 1,870,000 acres, and comprising about 70 per cent of the area in the three counties. Its general aspect is westerly, facing and looking down upon the plains of the Sacramento Valley. Elevations along the western boundary average about 1,000 to 1,500 feet, rising in a distance of 40 miles in a west-to-east direction to mountains ranging up to 9,000 feet along the eastern boundary. Associated with the increase in elevation is a marked transition in land character and use. Between 1,000 and 3,000 feet agricultural land (used mainly for livestock grazing and fruit farming) is interspersed with second-growth pine forests. Within this upper-foothill zone are thousands of acres of former agricultural land abandoned before the turn of the century and restocked by volunteer second-growth timber, much of which reached merchantable size about the end of World War II. Above 3,000 feet, the general altitudinal limit of agriculture, there is a relatively unbroken cover of commercial forests, which finally terminates at about 7,000 feet in the alpine areas of the high mountains.

The relief of this mountainous terrain is primarily determined by the drainages of the Cosumnes River, the South, Mid-

dle, and North Forks of the American River, the Bear River, and the South Yuba River, whose deep canyons divide the region into a series of approximately parallel ridges extending east and west. Conforming to this west-east oriented topography, two major highways, U.S. 40 and 50, afford a means of transportation west into the Sacramento Valley and east into Nevada. The only principal highway route extending in a north and south direction is state highway 49 in the foothills, which approximately marks the lower edge of the commercial forest zone and connects the region's major urban centers, Placerville, Auburn, Grass Valley, and Nevada City. In addition to these major transportation routes, a system of county roads provides access to all the main divides where commercial timber operations are conducted.

As logs in the region are hauled entirely by truck, both to local sawmills and to mills in the Sacramento Valley, the present road system is vital to the functioning of the forest industry. All mills are located either on or near hard-surfaced roads, and most mills depend on these roads not only for transporting logs but also for truck hauling of lumber products to markets outside the region. Several of the larger mills, however, use railroad services for reaching more distant markets.

Ninety-three per cent of the study region's land area is comprised of forest or brush land. Of the total of 1,870,000 acres, 1,248,000 (66 per cent) were classified in 1952 as commercial forest land suitable for growing timber crops; another 489,000 acres (27 per cent) were classified as noncommercial forest land supporting mostly hardwoods and chaparral. The remaining 133,000 acres include nonforest land and land used for grazing or agriculture; the latter being located mainly in the foothills on relatively level terrain.



Fig. 1. The Central Sierra Nevada Region.

As the table below shows, in 1952 the region's commercial forest was chiefly composed of two major timber types: pine—Douglas-fir—fir. The lodgepole pine type is of limited commercial importance at present.

TIMBER TYPE	AREA IN ACRES
Pine—Douglas-fir—fir	726,000
Pine	409,000
Fir	76,000
Lodgepole pine	37,000
Total	1,248,000

A little more than half the commercial forest area in 1952 was comprised of stands containing both old- and young-growth timber, while the remainder was chiefly young growth or nonstocked, as shown here.

TIMBER AGE CLASS	AREA IN ACRES
Old growth	5,000
Old growth—young growth	256,000
Young growth—old growth	409,000
Large and small young growth	378,000
Nonstocked	200,000
Total	1,248,000

(Continued on page 14)

Terms used in this Bulletin

The classifications used in this study are based on those used in the Forest Survey conducted by the Pacific Southwest (formerly California) Forest and Range Experiment Station, U.S. Forest Service. Some important classifications used are defined below.

Land area

Forest-land area. Includes (a) lands which are at least 10 per cent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees in (a) have been removed to less than 10 per cent stocking and which have not been developed for other use; (c) afforested areas; and (d) chaparral areas.

Commercial forest-land area. Forest land which is (a) producing, or physically capable of producing, usable crops of wood (usually saw timber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Noncommercial forest-land area. Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land and (b) incapable of yielding usable wood products (usually saw timber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future. Includes chaparral land.

Nonforest-land area. Land that does not qualify as forest land. Includes

land which has never supported forest growth; land from which the forest has been removed to less than 10 per cent stocking and has been developed for other use, such as grazing, agricultural, residential, or industrial; all land in thickly populated urban and suburban areas; and water classified by the Bureau of Census as land.

Commercial timber types

Pine—Douglas-fir—Fir. Areas with mixtures of the commercial pines and/or Douglas-fir, incense cedar and the true firs in which no one species comprises as much as 80 per cent of the commercial conifer cover.

Pine. Areas with ponderosa, Jeffrey, or sugar pine comprising more than 80 per cent of the commercial conifer cover.

Fir. Areas with true firs comprising more than 80 per cent of the commercial conifer cover.

Lodgepole pine. Areas with lodgepole pine comprising 80 per cent or more of the commercial conifer cover.

Timber stand age classes

Old growth. Stands in which mature trees (trees considered to have passed their optimum growth) compose more than 80 per cent of the conifer canopy.

Old growth—young growth. Stands in which mature trees compose from 50 to 80 per cent of the conifer canopy.

Young growth—old growth. Stands in which mature trees compose 20 to 50 per cent of the conifer canopy.

Young growth. Stands in which mature trees compose less than 20 per cent of the conifer canopy.

1. *Large young growth.* More than 20 per cent of the immature trees are larger than 11.0 inches d.b.h.

2. *Small young growth.* Eighty per cent or more of the immature trees are less than 11 inches d.b.h.

Type of private ownership

To simplify the discussion, owner types are grouped in three major interest categories:

Timber interests—owners who are primarily interested in timber operations or holding timber for sale to others. They include:

Timber-operating company. A corporation actively engaged in commercial logging and milling of timber as a major enterprise.

Timber-holding company. A corporation holding timber land for future commercial timber operations. The timber may be held for the company's own future use or to sell to other operators.

Timber-operating individual. A person whose major enterprise is commercial timber operations. This includes individuals logging timber, operating a large or small sawmill, or splitting timber commercially for sale.

Timber-holding individual. A person holding timber land for future commercial timber operations. The timber may be held for his own future operations or to sell to other operators.

Agricultural interests—owners whose primary interest and activity is in ranching or farming. They include:

Range-livestock-farming company. A corporation engaged primarily in range-livestock-farming operations.

Range-livestock-farming individual. A person whose major enterprise is range-livestock-farming.

Other farmers. Persons or corporations that have farming as their major activity, but whose principal agricultural enterprise is not range-livestock-farming.

Miscellaneous interests—owners holding land for recreational or other miscellaneous purposes. They include:

Recreational property owners. Persons or corporations holding land principally for recreational purposes.

Other classified owners (miscellaneous use). All other land owners whose classification is known but does not logically fit the classes listed above. Examples are owners of land held for residential purposes only, mining claims, and reservoir sites.

Other terms

Stumpage. In a general sense, standing timber. Also may mean the value of timber as it stands uncut in the woods.

Log scale. The lumber contents of a log, or of a number of logs considered collectively, based on a specific log rule. Scaling is the measurement of a log, or logs, to estimate its lumber volume, as indicated by a particular log rule and scaling practices.

Detailed data on timber volumes and growth are not available for the region, but recently published estimates for the three counties place total timber volume at 25.5 billion board feet, of which 37 per cent is pine (California Chamber of Commerce, 1958).

The role of forests in the local economy

The importance of forests in the region's economy has increased as the result of the greater demand for lumber, increased production, and growing employment in the forest industry. From 1930 to 1950 total employment in the three counties increased 42 per cent, from 18,510 to 26,329 persons. During the same period employment in lumber manufacturing increased more than five-fold from 405 to 2,119 persons (U.S. Department of Commerce, Population Census, 1930, 1940, 1950). By the third quarter of 1956, 159 firms classified under lumber manufacturing employed a total of 3,339 persons, a 58 per cent increase in less than seven years (California Chamber of Commerce, 1958).²

This increase of employment in forest industry has been accompanied by a transformation in the nature of the region's economy. Until about 1940 employment largely centered around three basic industries, agriculture, mining, and lumber manufacturing. Since then employment has shifted from these basic industries to service industries such as wholesaling, retailing, transportation, utilities, etc. The trend in the three counties can be seen in the following figures:

	EMPLOYMENT	
	BASIC INDUSTRIES PER CENT	SERVICE INDUSTRIES PER CENT
1930	58	40
1940	46	53
1950	31	68

² This and the following section (pages 14 to 23) are based on data compiled for the entire areas of the three counties. Data for the study region alone are not available. However, since

The notable exception to this pattern of shifting employment, in which service industries have assumed prominent status in the local economy, is the lumber industry (appendix table 1). During the period in which employment in the basic industries showed a net decline of 25 per cent, employment in the lumber industry increased by 402 per cent.

Underlying these changes is, of course, a moderately expanding economy in which services, trade, and distribution grow in importance. In recent years the region's scenic splendor and recreational opportunities have drawn increasing numbers of tourists, stimulating business and employment in the various services. Similar effects have resulted from the influx of new residents who have established homes in the region and commute to jobs in the industrial and business centers of the Sacramento Valley. At the same time the pleasant climate of the foothill country has attracted people from all over the state to settle there after retirement; they, too, are lending impetus to the expansion of service industries.

Lumbering and agriculture are the economic mainstays of the region today, employing, in 1950, 70 per cent of all persons in the basic industries, and indirectly supporting to a large extent the various service establishments. At no time in the past has the role of the region's forest industry been as important as at present. According to the 1950 census, one out of every four persons in basic industry was connected with the harvesting, transportation, conversion, and marketing of forest products. Since 1950 this role has grown in importance. A substantial gain in the output of forest products has resulted in greater employment in the industry than ever before. The rapid fall in gold production in

the region includes nearly all of the forest industries in the counties, the general situation described is believed to be an accurate representation of the economic setting of this study.

Nevada County from 1.8 million dollars in 1955 to 800 thousand in 1956, and finally the closing of the mines in 1957 (California Chamber of Commerce, 1958), emphasized the important economic status of forests and forest industries in that area. The national recession of 1957 and the subsequent closing down of many mills also had an impact on the local community and clearly proved that the economy depends heavily on productive activity in the region's forests.

Forest industries

The forest industries of the Central Sierra Nevada have developed around lumber. Production of lumber fluctuated around 80 million board feet annually throughout the 1920's, declined drastically in the depression of the thirties and, with a series of fluctuations, climbed to a record output of 376 million feet in 1956 (May and Baker, 1956). The lumber industry of the area, producing originally for local consumption, has steadily expanded its market and today reaches both state and Eastern markets.

The importance of lumber. By far the greatest share—almost the total—of log output goes to lumber manufacturing

(table 1). In 1956, for instance, the total output of the region's timber products was 476 million board feet, 472 million feet of which were sawlogs for lumber manufacture (May and Baker, 1958). This reflects but a slight proportional change during the decade since 1946, when 318 million board feet were produced, 314 million feet of which were sawlogs (Burks, Vaux, et al., 1948). In 1946 sawlogs amounted to 98.8 per cent of total output; in 1956, to 99.0 per cent.

The 4 million board feet of the 1956 output not used for lumber were mainly used as veneer logs and bolts; pole, piling, and mine timber logs; and pulpwood. Output of veneer logs and bolts was relatively unchanged from 1946, amounting to about 1.5 million board feet. At present there is one green-veneer plant in the region, but two veneer plants in the Sacramento Valley operate on logs and bolts part of which are purchased in the region. During the period of study there was no special market for quality veneer logs especially valuable in plywood fabrication, as production of veneer was solely for container uses. This situation has remained essentially the same, although a new plywood plant at

Table 1. Output of timber products in the Central Sierra Nevada Region, 1946 and 1956

Product	1946		1956	
	Log volume Thousand feet	Total production Per cent	Log volume Thousand feet	Total production Percent
Sawlogs.....	313,890	98.8	471,575	99.0
Veneer logs and bolts.....	1,620		1,685	
Poles, piling, and mine timber logs.....	780		1,466	
Split products.....	310	1.2	280	1.0
Pulpwood.....			1,085	
Shingle and shake bolts.....	1,000		25	
Totals.....	317,600	100.0	476,116	100.0

Sources: Burks, George F., Vaux, Henry J., et al. Commodity production from commercial forest land in California—1946. California Forest and Range Experiment Station Forest Survey Release No. 6, Table 15. June, 1948; May, Richard H., and Baker, H. L. Output of timber products in California, 1956. California Forest and Range Experiment Station Forest Survey Release No. 35, Tables 4, 11, 12, 13, and 14. December, 1958. Also California Division of Forestry. Production of California timber operators, 1956.



A large sawmill in El Dorado County. Mills of this size produced 65 per cent of the 1956 lumber output in the Central Sierra Nevada Region, and showed a high degree of operating stability during the period of study.

Martell in Amador County is now receiving some raw material from the area.

On the other hand, output of poles and piling increased substantially during the postwar years; the 1956 production was twice that of 1946. But in general, markets for such small material are limited, and few forest owners have outlets for these products.

At present there are no pulpwood or fibreboard plants in the region, and pulpwood production has been limited and declining in importance. Until recently the Fibreboard plant at Antioch purchased some pulpwood from private sellers, but reflecting the general substitution in favor of chips, pulpwood production has declined steadily from 17 million board feet in 1951 to 1 million feet in 1956. As a practical consideration, there is no pulpwood market available to most forest owners.

Trends in timber production. The postwar pattern of timber operations in the region is shown by the record of timber operators receiving permits from the California Division of Forestry (figure 2, appendix table 2). This record

is somewhat incomplete, since production reports are obtained only from those timber operators who provide such information during the following year; but it is the best available record of annual timber output. These reports show a decline in commodity output from 1947 to 1949, a sudden, rapid increase to a record output in 1951, a slight dip, and a new peak in 1953 of 475 million board feet. Then another decline and upturn followed with production leveling out in 1955 and 1956 at about 450 million feet.³

In 1957 production dropped in response to the national economic recession, this time to the lowest level since 1949. Although output data for 1958 are not yet available, the number of registrants were fewer than the preceding year and production probably stayed below the peak years of 1955 and 1956.

The number of reported timber operators reflected output trends, but showed

³ The 1956 data given here differ from those given on page 15 because reports by the U.S. Forest Service and California Division of Forestry are obtained through different procedures, and because of net shipment of logs out of the region.

pronounced differences for specific time periods. The 68 per cent increase in timber output from 1949 to 1951, for example, was achieved with a 53 per cent increase in timber operators. Evidently the increased production during the period was the result both of additional operators entering the industry and of greater activity by operators already in the business of cutting timber. In the period 1951-1953 total production remained relatively constant at 470 million board feet, while the number of timber operators increased 40 per cent from 185 to 259. This increase in timber operators continued through 1954, in spite of a 17 per cent drop in output, and finally reached a peak of 336 operators in 1955. These facts suggest increasing rivalry among timber operators in obtaining existing timber supplies between 1951 and 1955. At the same time average production per operator fell by slightly less than half. Beginning in 1955, and lasting through 1958, the number of operators declined as fast as it had increased during the previous four years.

Trends in lumber production. Underlying the recent growth of the forest economy in the Central Sierra Nevada has been the lumber industry. Lumber production doubled from 188 million board feet in 1945 to 376 million feet in 1956 (May, 1953; May and Baker, 1957), the peak year in more than a century of lumber operations (table 2). This period was marked by a tremendous expansion in 1946 when, within one year, the number of sawmills in the region more than doubled and production rose from 188 million board feet to 326 million board feet. This remarkable increase in output largely was accomplished by small mills producing less than 10 million feet annually. Their establishment coincided with the greatly increased demand for lumber following the war and the availability of newly merchantable second-growth timber on lands cut over or abandoned during the gold period. Many of the small mills established during the early postwar period closed down after only a brief period in operation.

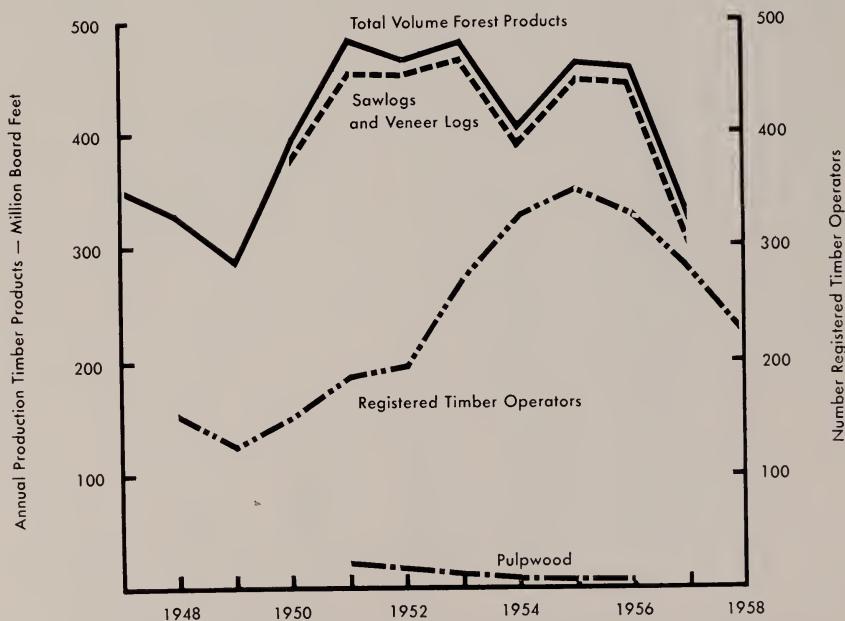


Fig. 2. Timber production in the Central Sierra Nevada Region, 1947-1957.

Table 2. Lumber production and number of sawmills, Central Sierra Nevada Region, 1940-48, 1951, and 1956

Year	Active	Lumber
	sawmills	production
	Number	Thousand bd. ft.
1940.....	27	142,229
1941.....	31	153,835
1942.....	31	142,563
1943.....	41	154,829
1944.....	56	175,578
1945.....	73	188,294
1946.....	135	326,539
1947.....	118	332,713
1948.....	115	305,890
1951.....	77	346,116
1956.....	51	376,099

Sources: Table 4, Forest Survey Release No. 20; Table 6, Forest Survey Release No. 30. California Forest and Range Experiment Station.

The increase in lumber production after 1946 was more moderate in this region than in other areas and in the state as a whole. Between 1946 and 1956 lumber production in California in-

creased by 82 per cent, but by only 14 per cent in the region (May, 1952; May and Baker, 1957).

Until recently, ponderosa pine dominated the lumber output of the region (figure 3; appendix table 3). Of the 1946 production 56.0 per cent was ponderosa pine, 16.8 per cent white and red fir, and 11.6 per cent Douglas-fir (May and Simontacchi, 1947). During the next decade ponderosa pine production declined steadily, while the output of true firs and Douglas-fir increased twofold, more than making up for losses in ponderosa pine. In 1956 ponderosa pine output was down to 36 per cent of the total, while the true firs (principally white fir) had increased to 33 per cent (May and Baker, 1957).

The increased lumber production in the postwar period was achieved by a steadily decreasing number of sawmills. From a peak of 136 mills in 1946 the number declined to 51 in 1956. Sawmill mortality was especially high for mills producing less than 10 million board feet annually. On the other hand, mills producing more than 10 million board feet

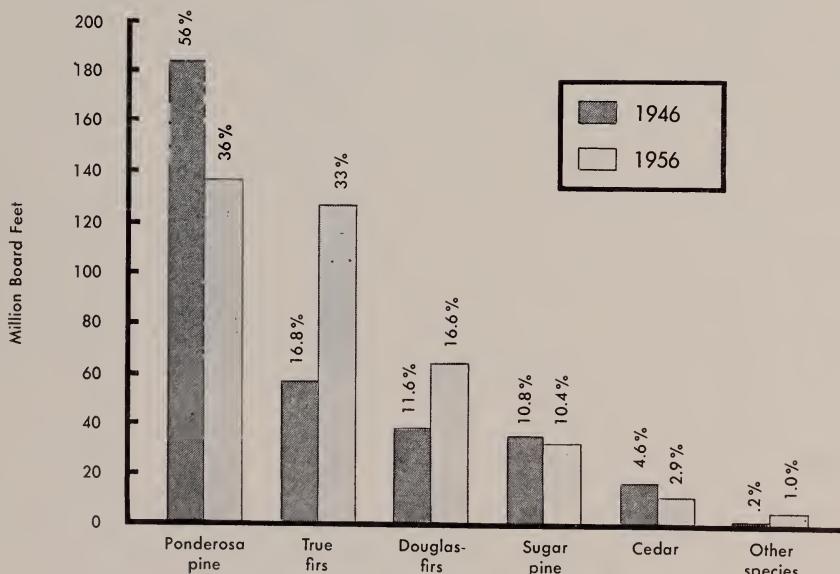


Fig. 3. Lumber production by species, Central Sierra Nevada Region, 1946 and 1956.

increased both in numbers and in proportion of annual lumber output.

These trends are indicated by a comparison of the sawmill population and lumber production by mill-size class over time (table 3). In 1946, 58 per cent of the 136 sawmills in the region were very small mills each producing less than 1 million board feet annually. These very small mills, however, accounted for only 6 per cent of the total output that year. Small mills producing from 1 to 9.9 million board feet annually accounted for another 35 per cent of the mills operating and were much more important in total volume of output. Together, small mills and very small mills formed 93 per cent of the sawmill population and produced 51.5 per cent of the total lumber output. The remaining 48.5 per cent of the production was concentrated in 9 medium and large mills each of which produced 10 million feet or more.

During the next five years the number of very small mills was reduced from the 58 per cent of the total in 1946 to 34 per cent in 1951. At the same time the proportion of annual output by these mills dropped from 6.4 to 2.6 per cent. The number of small mills producing 1 to 9.9 million board feet a year declined slightly, but lumber production by mills within the class expanded sufficiently to increase by 5 per cent their proportion of total output to 51 per cent. Production by medium and large mills remained nearly constant, but due to changes in the small and very small classes, accounted for a greater proportion of mills but a smaller proportion of output.

Between 1951 and 1956 the decline in number of very small and small mills continued. In 1956 there were 39 such mills, as against 69 in 1951. Unlike the previous five-year period, the proportion of total output by these mills fell; by 1956, they accounted for about a third of the production, contrasted to half in 1951. Medium and large mills increased their share of output from 46 per cent

Table 3. Lumber production in the Central Sierra Nevada Region, by mill size class, 1946-51-56

Mill size class	1946			1951			1956					
	Active sawmills		Lumber production	Active sawmills		Lumber production	Active sawmills		Lumber production			
	Number	Percent	MBM	Percent	Number	Percent	MBM	Percent	MBM			
Very small (less than 1.0 MMBF)	79	58.2	21,051	6.4	26	33.8	8,846	2.6	8	15.7	3,363	0.9
Small (1.0-9.9 MMBF)	48	35.2	147,406	45.1	43	55.8	177,862	51.4	31	60.9	129,701	34.5
Medium and large (10.0 MMBF and over)*	9	6.6	158,302	48.5	8	10.4	159,408	46.0	12	23.4	243,035	64.6
All classes	136	100.0	326,759	100.0	77	100.0	346,116	100.0	51	100.0	376,099	100.0

* In 1946, 3 mills produced 25 MM bld. ft., or more. In 1951, 2 mills produced 25 MM bld. ft., or more. In 1956, 3 mills produced 25 MM bld. ft., or more.
Source: Data supplied by R. H. May, Division of Forest Economics, California Forest and Range Experiment Station.

to 65 per cent, while the number of such mills increased from 8 to 12. There were no entirely new medium or large mills established during the period, but several small mills expanded their operations so that they moved into a larger production class.

These changes in the structure of the industry were marked by considerable instability within the sawmill population. Many mills were short-lived. For example, of 77 sawmills operating in 1951, only 37 were still operating five years later. Nearly all the 1956 lumber output—92 per cent—was produced by these 37 surviving mills. However, 16 of the mills were under management different from that in 1951. Approximately a third of the lumber output in 1956 was by either new mills or mills under new

management. Two-thirds of the production came from mills which had undergone no change over the five-year period.

Lack of permanence was particularly striking for mills producing less than 10 million board feet annually. Of 69 such mills operating in 1951, only 25 were still operating five years later. All except one of the very small mills closed down between 1951 and 1956.

The above analysis is based on data which do not account for all the changes that probably occurred. Undoubtedly some mills were established and closed down within one of the five-year periods, while others may well have changed ownership more than once. It is reasonable to conclude that the industry was actually more unstable than has been described here.

Table 4. 1956 production of mills by change in ownership status classes, Central Sierra Nevada Region

Mill status in 1956	Mills		Production in 1956	
	Number	Per cent	MBM	Per cent
New mill since 1951.....	14	27.5	28,102	7.5
Same mill, different owner since 1951.....	16	31.4	108,237	28.8
Same mill, same owner.....	21	41.1	239,760	63.7
Totals.....	51	100.0	376,099	100.0

Source: Data supplied by R. H. May, Division of Forest Economics, California Forest and Range Experiment Station.

Table 5. Number of active sawmills in 1956 by size classes with change in ownership since 1951, Central Sierra Nevada Region

Mill size class in 1956	Change in status since 1951		
	New mill	Same mill, different owners	Same mill, same owners
Very small (less than 1.0 MMBF).....	7	1	..
Small (1.0-9.9 MMBF).....	7	14	10
Medium and large (10.0 MMBF and over).....	..	1	11
Totals.....	14	16	21

Source: Data supplied by R. H. May, Division of Forest Economics, California Forest and Range Experiment Station.

During the period 1951 to 1956, which is of particular interest in this study, lumber production reached and remained at a comparatively high level. Thus timber owners enjoyed better market prospects over most of this period than at any time since World War II. The large increase in timber operators confirms this conclusion and indicates that owners had greater opportunity to come into contact with potential buyers. But production has fluctuated, with wide variations in some years. And since 1956 the number of operators and output have declined substantially. High production has not been the result of additional mills. Sawmill-log markets have actually contracted in number while remaining mills have expanded their production and their share of raw-material purchases.

Lumber and resource ownership

Relationships between past and future trends in the lumber industry, log supplies, and resource ownership are vitally important to the forest economy of the region. The industry can only maintain itself on the basis of sustained log supplies, which in turn depend on various factors pertaining to forest ownership and management. A 1957 survey in the region, to be discussed more fully on pages 23 to 29, provides an up-to-date picture of the ownership situation.

The survey showed that commercial forest land in the region was about evenly divided between public and private ownerships (table 6). Commercial forest land held in public ownership, largely national forest, included 56 per cent of the pine—Douglas-fir—fir type in the study region as contrasted to 27

Table 6. Commercial forest land in the Central Sierra Nevada Region by type of ownership and by timber types, 1957

Type of ownership	Total		Timber type*			
			Pine	Fir	Pine; Douglas fir; fir	Lodgepole pine
	Thousand acres	Per cent	Thousand acres			
Public and Utilities						
Federal.....	583	46.8	109	50	404	20
State, county, and municipal.....	16	1.3	8	1	7	..
Utilities.....	32	2.6	6	4	22	†
Total.....	631	50.7	123	55	433	20
Private						
Timber interests.....	337	26.9	80	18	227	12
Range and farming interests.....	110	8.8	88	1	18	3
Recreational and other classified owners.....	170	13.6	118	2	48	2
Total.....	617	49.3	286	21	293	17
All types.....	1,248	100.0	409	76	726	37

* Timber type areas from 1952 vegetation survey made by the California Forest and Range Experiment Station; ownership areas from 1957 survey by School of Forestry.

† Less than 500 acres.

per cent of the pine type. Various utilities held 3 per cent of the commercial forest land, again largely in the pine—Douglas-fir—fir type. Timber operating and timber holding companies and individuals owned 27 per cent of the commercial forest land, 67 per cent of which was in the pine—Douglas-fir—fir type. Range-livestock and other farming individuals held 9 per cent of the commercial forest land, including a 21 per cent of the pine type. Individuals and companies interested in recreational and miscellaneous uses of the land held 14 per cent of the commercial forest land, and 29 per cent of the pine type. This group includes some mining companies which in recent years have either been disposing of their timber prior to selling the land or else holding timber for sale to timber operators.

The pattern of commercial forest-land ownership shows a concentration of such land in small ownerships (table 7). In 1957, 33 per cent of all commercial forest land in the region was held in properties less than 5,000 acres in size. These small properties included 63 per cent of the pine type and 20 per cent of the pine—Douglas-fir—fir type. Private holdings of 50,000 acres and larger, by contrast, included only 10 per cent of the total commercial forest-land area.

Evidently, small forest ownerships in which timber is not the main object of interest have been important sources of timber supplies. In 1957, timber-operating companies and individuals controlled 17 per cent of the total (public and private) commercial forest land in the region. Governed by sustained yield considerations, publicly owned forests could only partly supply the timber needed by these operators. In 1956 sawlog sales in the two national forests of the region (the Tahoe and Eldorado National Forests) were only 17 per cent of the log production reported by timber operators. For the five-year period 1951 to 1956, national-forest sales averaged a fifth of the log output. Thus it is apparent that private timber supplies have supported a major part of total production, and that small-forest properties have been heavily used sources of needed timber.

Forestry and markets

These small-forest owners characteristically had limited marketing experience and were primarily interested in other fields (marketing aspects are discussed on pages 30 to 55). The rapid changes in small sawmills and the widespread role of independent loggers in supplying these mills have contributed to

Table 7. Privately owned commercial forest land by size of ownership and by timber types, Central Sierra Nevada Region, 1957

Size of ownership in acres	Total		Timber type*			
	Thousand acres	Per cent	Pine	Fir	Pine; Douglas fir; fir	Lodgepole pine
			Thousand acres			
Under 5,000.....	417	67.6	256	8	144	9
5,000–49,999.....	74	12.0	20	3	49	2
50,000 and over.....	126	20.4	10	10	100	6
All sizes.....	617	100.0	286	21	293	17

* Timber type areas from 1952 vegetation survey made by the California Forest and Range Experiment Station; ownership areas from 1957 survey by School of Forestry.

the existence of an unstable but active market in which the forest owners usually played a passive role.

The future of the region's forest industry will partly depend on how well the market operates to ensure future crops of timber from these small properties. Since most of the forest land is not owned by sawmill operators, the timber market will play a fundamental role in providing necessary timber supplies and in determining the role of the industry in the

local economy. It is only through the market that the forces of demand can reach the nonintegrated timber owner and affect his management decisions—which in turn affect how much and what kind of timber is grown on his land. Similarly, it is only through the market that the nontintegrated wood-utilization plants can obtain raw materials for processing. Thus an effective market is essential to an effective forest economy in the region.

LAND AND FOREST OWNERSHIP

To evaluate the effectiveness of the timber market in the region, it is helpful first to examine the characteristics of the supply source—the forest owners. What types of persons own forest land? What is the nature of their ownership? These are important questions, because the abilities and interests of forest owners as sellers are related to their purpose in holding land and how the land is used. The decisions these owners make determine the use and management of forest resources, and directly affect their productivity. Thus a knowledge of land ownership is a necessary part of a study of timber markets, and is also basic to an understanding of the possibilities for future development of forest resources and forest industries.

A survey of land and forest ownership in the region was undertaken in late 1957 to establish the pattern of ownership as related to the size, type, and address of land owners. Data collected on a sample of ownerships were combined with forest-survey information supplied cooperatively by the Pacific Southwest Forest and Range Experiment Station and used as a basis for estimating the total number of owners and the area in various ownership classes (see description of methods in appendix, page 56). The details discussed here are, therefore, based

on statistical estimates rather than actual measurements of all ownerships in the region. All ownership information was obtained from public records in the counties studied.

Public ownership

According to the survey, about 49 per cent of the region, or 910,000 out of 1,870,000 acres, were in federal, state,

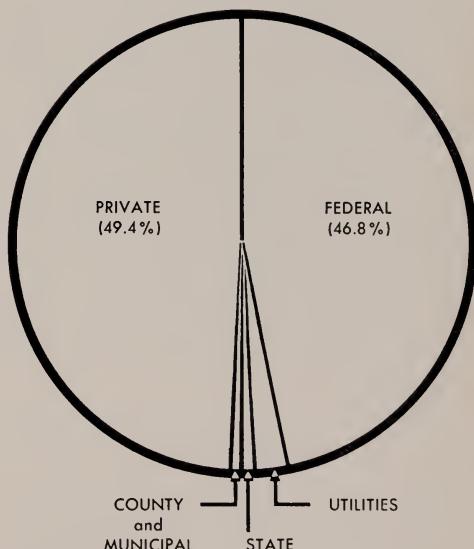


Fig. 4. Ownership of commercial forest land in the Central Sierra Nevada Region.

**Table 8. Total land area by major classes of land and by ownership class,
Central Sierra Nevada Region, 1957**

Class of land	Total all owner- ships	Federal	State	County and municipal	Utilities	Private
Thousand acres						
Forest land						
Commercial.....	1,248	583	5	11	32	617
Noncommercial.....	489	253	..	1	17	218
Total forest land.....	1,737	836	5	12	49	835
Nonforest land.....	133	46	*	11	3	73
All land.....	1,870	882	5	23	52	908

* Less than 500 acres.

Sources: Commercial, noncommercial, and nonforest land areas from unpublished 1952 vegetation survey by the California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

county, and municipal ownership. Two-thirds of this publicly held land was commercial forest land, nearly all of which was in the federally owned Eldorado and Tahoe National Forests, and used mainly for the production of forest crops. In federal ownership were 882,000 acres, including 583,000 acres of commercial forest land. State holdings totaled 5,000 acres, all of which was commercial forest. County and municipal lands amounted to 23,000 acres, half of which was commercial-forest land. Most of the county and municipal lands were in domestic- and irrigation-water districts.

Land held by utilities such as railroad⁴ and power-generating companies amounted to 52,000 acres, 32,000 of which were commercial forest land. Because of the special nature of these holdings, they were classed separately and excluded from the analysis of private ownership.

The balance of land area in the region, 908,000 acres, was held in private ownership.

⁴ In the case of railroads, only right-of-way and other special use lands are included in this classification. Holdings of affiliated land companies are included under general private ownership.

Pattern of private ownership

Size of ownership. An outstanding characteristic of privately owned land in the Central Sierra Nevada is its concentration in small ownerships of less than 5,000 acres (figure 5). An estimated 6,080 private owners held 908,000 acres in 1957. Only nine of these owners had more than 5,000 acres. Nearly 99 per cent of the ownerships, including over 70 per cent of the private land, was in small properties of less than 5,000 acres. More than four-fifths of the owners, with one-fifth of the land, owned less than 180 acres in properties averaging 37 acres in size.

Ownership of commercial forest land follows this same pattern. Two-thirds of the privately owned commercial forest land in the region was held in small ownerships, and one-third in properties 5,000 acres or larger. Some further details deserve special note. Forty-six per cent of the private commercial forest land in the region was in properties of less than 700 acres. Forest holdings of ownerships greater than 50,000 acres—where, incidentally, timber was the major interest—were slightly exceeded in area by such holdings in ownerships of less than 180 acres. Medium-size properties

between 5,000 and 49,999 acres included less than a tenth of the total land and only 12 per cent of the commercial forest land (appendix table 5).

Forest ownership in the region, then, fell into two broad size classes: large ownerships which included one-fifth of the commercial forest land, and small ownerships which totaled more than three-fifths. This demonstrates the important position of small owners.

Ownership size alone does not tell the whole story of the forest situation, however. There are also important distinctions in the *kind* of forest land held by different sizes of owners.

For example, two-thirds of the commercial forest land in small ownerships (under 5,000 acres) was composed of pine-type forest. In fact, nine-tenths of this important type was held in small properties. Much of this forest type is located throughout the upper foothills and is interspersed with agricultural lands and other woodland and brush types. Forest values are enhanced because they are accessible by a comparatively well-developed road system. Log-

ging can often be carried on in these forests when winter has closed operations at higher elevations. Also, they often are on fairly level ground where harvesting operations are easily conducted.

Medium- and large-size ownerships, on the other hand, were mainly in the pine—Douglas-fir—fir type forests in the higher mountains, where such ownerships included half the type. Thus, the pine type was mainly in small ownerships, while the pine—Douglas-fir—fir type was split nearly equally between the small and the medium-to-large ownerships.

Important differences also were found in the proportion of various timber-age classes (see definitions on pages 12–13) by size of ownership. In general, forests in small ownerships have a longer history of cutting and have been cut more heavily in the past than those in larger holdings. As a result, small ownerships included less old growth and more young growth, in proportion to area, than did the others. Half the commercial forest land in small ownerships was classified as either large or small young-growth timber. Medium and large ownerships,

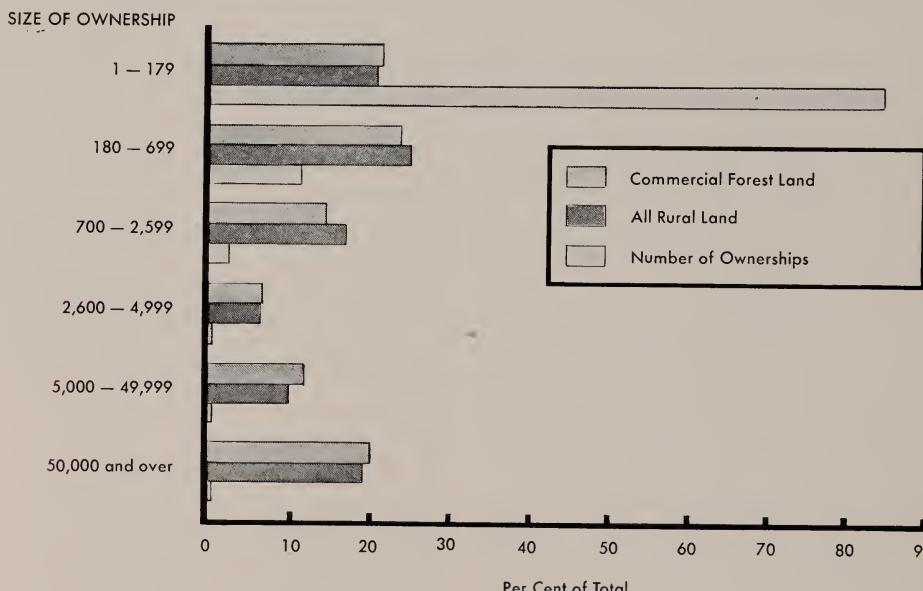


Fig. 5. The pattern of private land and forest ownership, by size of ownership, in acres, Central Sierra Nevada Region, 1957.

by contrast, largely included stands that contained old-growth timber; only one-fourth of the area was large or small young growth.

One aspect of these relationships has important implications for the future. This is the fact that one-fourth of the private commercial forest land in the region was large young growth held in small ownerships. As the old-growth timber is gradually cut out, this age class will become increasingly important as a source of potential timber supplies. Actual production will, of course, depend heavily on the kind of management these young-growth forests are receiving now and will receive in the future.

A final consideration is the ownership and management of the 135,000 acres of nonstocked, idle commercial forest land. This land, amounting to slightly more than one-fifth of the private commercial forest land, was primarily held in small ownerships. One-tenth was in ownerships greater than 5,000 acres, while the balance was in smaller properties. In fact, 30 per cent of the commercial forest land in small ownerships was nonstocked. If the forest resource is to make the largest possible contribution to the region's economy, the restoration of these idle forest lands to production will be required. Whether this will actually happen is uncertain at present. Observations made during a survey among small-forest owners in the region indicated a significant but limited interest in planting idle land. Bearing on the situation are a variety of social-economic factors, one of which is the extent to which returns on investment in forest holdings result in incentives to grow timber. Again, this underscores the importance of timber markets in the region.

Type of ownership. Directly related to the size pattern of ownership is the type of owners who hold the land. In this study owners were classified into 11 groups differentiating between corporate and individual ownerships, operating

and nonoperating owners, farm and non-farm properties, and recreational and nonrecreational holdings (see Definition of Terms, pages 12-13). The pattern with respect to type of ownership is shown in figure 6 and appendix table 4.

Timber interests. Of the more than 6,000 private land owners in the region, an estimated 14 were timber-operating companies. These 14 corporate enterprises held one-fourth of the private commercial forest land and slightly less than one-fifth of the total private land area. The bulk of this area, including more than four-fifths of all land in the class, was in four ownerships exceeding 10,000 acres in size. Thus, most land held by this type of owner was held in medium and large-size ownerships by companies actively engaged in commercial logging and milling of timber as a major enterprise. In fact, more than half the land in ownerships larger than 5,000 acres was held by these medium- and large-size companies.

Holdings of timber-operating companies were mainly in the pine—Douglas-fir—fir type, and consisted mostly of old growth-young growth and young growth-old growth stands. A high proportion (92 per cent) of all land held by this ownership type was commercial forest land.

Noncorporate timber operators consist of individuals whose major enterprise is commercial timber operations. This group includes individuals logging timber, operating large or small sawmills, or splitting timber commercially for sale. Owners of this type were comparatively unimportant, holding less than 1 per cent of all private land and of the private commercial forest land.

Thus, taken together, enterprises whose major activity is commercial timber operations controlled only 18.7 per cent of all privately owned land and 25.1 per cent of the private commercial forest land. The balance of the private commercial forest land in the region—some

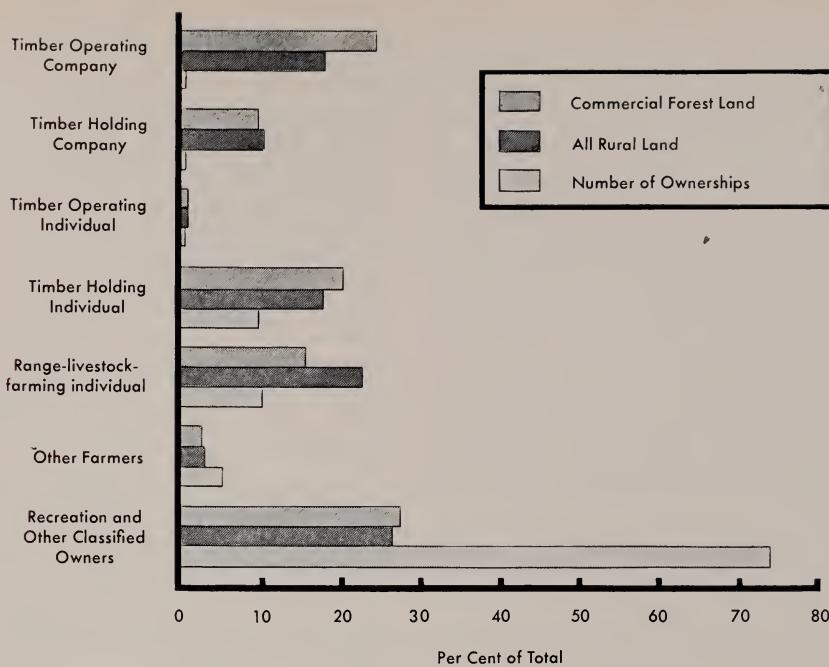


Fig. 6. The pattern of private land and forest ownership, by type of ownership,
Central Sierra Nevada Region, 1957.

462,000 acres—was held by owners not engaged in timber operations.

Two other ownership types on which timber is the primary interest include individuals or corporations holding timber land for future commercial timber operations, either for sale to others or for their own use. In terms of both numbers and area, timber-holding individuals were the more important of the two types. This group accounted for nearly one-tenth of the private ownerships and held one-fifth of the private commercial forest land. All but one of these 578 ownerships, with 91 per cent of the land area in the class, were less than 5,000 acres in size. In fact, 93 per cent of these ownerships, with 60 per cent of the land, were less than 700 acres. Thus, this type of ownership is characterized by small holdings. Included in it are properties held by owners not familiar with timber management or operations. Since property values and land-use possibilities were largely in timber

and timber growing, they were classed as timber holders. Timber holding companies included 23 organizations holding 9 per cent of the private commercial forest land. Four-fifths of all land in this ownership type was in one large ownership, while most of the remaining area was in properties between 700 and 5,000 acres. Commercial forest land in the type was largely in the pine—Douglas-fir—fir type, containing mostly old growth—young growth and young growth-old growth. By contrast, forest land held by individuals was more evenly distributed between the pine and mixed conifer types, and contained large and small young growth. One-fourth of this area was nonstocked.

In summary, individuals and corporations whose major interest in land was timber holding and operations totaled one-tenth of the private ownerships and controlled slightly more than half the private commercial forest land. Half the total land area held by these ownership

groups was in medium- to large-size properties, half in small properties less than 5,000 acres.

All the remaining owners were those whose major interests were ranching, other types of farming, recreation, and miscellaneous types not appropriately classified in other groups. These accounted for nine-tenths of the ownerships, half the land area, and slightly less than half (45.4 per cent) of the private commercial forest land.

Miscellaneous interests. The most prominent of these nontimber interests, both in numbers and area, were the 4,289 miscellaneous ownerships. But because it was frequently difficult to differentiate this group from recreational ownerships, these two classes were considered together. Ownerships in these two types include those holding land for recreational use, organization camps, residential or business properties, mining claims, and for other miscellaneous purposes.

Approximately three-fourths of all private ownerships in the region were in the recreational-miscellaneous class; it included more than one-fourth of all private land and commercial forest land, more than any other type of ownership. The outstanding feature of this class is the small size of its ownerships. With one exception, all properties were less than 5,000 acres; 93 per cent were less than 180 acres. Half the land area was in properties less than 180 acres; four-fifths in those less than 700 acres.

Thus about one-fourth of the private commercial forest land in the region was held in some 4,500 very small ownerships on which timber is of secondary importance to other purposes of holding land. Characteristically, the ownerships contain mostly large and small young-growth pine forests, with a large proportion nonstocked.

Agricultural interests. Owners whose interests in land were primarily agricultural included range-livestock-farming individuals and other farmers. Ranch-

ing individuals held 23 per cent of the private land and 15 per cent of the commercial forest land. Most ownerships in this group were small, with four-fifths of the owners and 47 per cent of the area in properties less than 700 acres. Ownerships from 700 to 5,000 acres held 56 per cent of the land area in the class. Most of the commercial forest land in the class is in the pine type of the foothill country, where grazing of forest land is common. Included in the class are properties which form part of large ranches whose major holdings were outside the region.

Other farmers were mainly those raising fruit crops. As a group, they were comparatively unimportant, holding only 2 per cent of the private commercial forest land, largely in pine forests, and of all private land. All such holdings were less than 700 acres.

Residence of owners. A third important aspect of land ownership in the region is the owners' residence. Various studies in other forest regions have shown that the interest, approach, and knowledge of nonresident owners differed from those who resided on their property (James, et al., 1951; Yoho and James, 1958). Accordingly, consideration is given here to the extent of nonresidency in the region and its relationship to different ownership types.

A comparatively large number of owners had addresses outside the region (figure 7 and appendix table 10). More than one-third of the owners—some 2,204—had addresses outside the study area; they held 44 per cent of the land and 43 per cent of the commercial forest land. Since an owner with an address inside the region may not necessarily live on his property, it is probable that absentee ownership is more prevalent than these data suggest. How much more was suggested by a field interview of 160 small forest owners in which it was found that 40 per cent lived outside the region, 21 per cent lived in the region but not on

ADDRESS OF OWNER

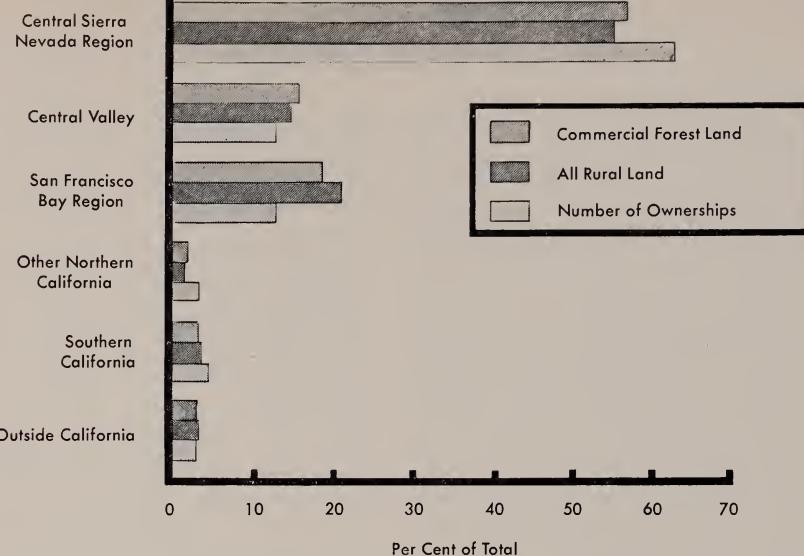


Fig. 7. The pattern of private land and forest ownership, by address of owner,
Central Sierra Nevada Region, 1957.

the property, and only 39 per cent actually lived on the forest property. These 39 per cent of the owners—those residing on their properties—held only 28 per cent of the total area in the sample.

Of the 2,204 owners living outside the region, two-thirds were concentrated in the Central Valley and the San Francisco Bay Region. Nonresident owners in these two areas held one-third of all private commercial forest land in the region, and more than four-fifths of all land held by nonresident owners.

Timber interests. More than four-fifths of the land held by timber operators, both corporate and individual, was in ownerships with addresses within the region; the balance was held by enterprises with operations in the Central Valley. In contrast, two-thirds of the land controlled by timber holders was in ownerships with addresses outside the region, although the number of such ownerships was about half the total. However, the land held by timber-holding individuals was nearly equally divided between residents in the region and nonresidents, as was the number of

owners, so that the large proportion of land held by timber holders outside the region was the result of nearly all such land in corporate ownerships having addresses outside the region.

Agricultural interests. Owners classed as agricultural interests were mainly residents in the region. About four-fifths of owners classed as "other farmers," with more than four-fifths of the land in the class, had addresses in the region. In contrast, only about two-thirds of the owners classed as ranching interests, with two-thirds of the land in the class, had addresses within the region.

Recreationists, in terms of numbers, mainly lived outside the region, but the land in the class was about evenly divided between owners living outside and inside the region. The average size of the latter was 130 acres, compared to 72 acres for properties whose owners had addresses outside the region. Owner residence in the other classified ownership group (miscellaneous uses) followed the general pattern for the region: a third of the owners, with a little less than half the land, lived outside the region.

WOODLAND MARKETING PRACTICES

The preceding discussion has shown that in 1957 about one-third of all commercial forest land in the region was privately held in small-forest ownerships, and that such properties included nearly two-thirds of the privately owned commercial forest land. Since wood-processing enterprises control only one-fourth of the private commercial forest land and one-eighth of all commercial forest land in the region, it is evident that products produced on the bulk of the forest properties necessarily move through the market to initial processors. The following examination of the timber market and marketing practices is focused on the small, non-industrial timber owners whose individual contributions are small but who, in the aggregate, control a large proportion of the wood-producing resource.

Timber marketing

Marketing has been described as "the focal point of the entire process of forestry" (Duerr, 1949).⁵ For this reason it is highly important that the marketing system provides both forest owners and timber buyers with adequate financial returns for their productive efforts. For small-forest owners in the Central Sierra Nevada marketing has a dual role: the sale of timber is also an act of forest management—usually the only one. Few owners engage in such preharvesting treatments as thinning and pruning. Development of timber quality is the re-

sult of natural-stand conditions as influenced by harvesting methods. The same is true of the regeneration of trees on cutover land. Thus marketing directly affects the future productivity of the forest. Because of this synthesis of management and marketing, the impact of established marketing customs on the forest is important. Over a short-period, major imperfections in timber-marketing practices may favor one group or the other, but in the long run efficient markets work to the benefit of buyers and sellers and the economy as a whole.

In this report timber marketing refers to the buying and selling of stumpage (the right to cut standing timber) or logs, with the emphasis on the exchange of these products between small forest owners and timber buyers. Sales involving title to both land and timber are not included, although such sales are common and often the timber is the major element in the transaction. This study is concerned with the market for the small owner who sells the product of the land, not with the market for the entire enterprise.

The term "timber market" is not used to mean a particular location where timber is bought and sold; rather, it is an abstraction. Timber exchanges between owners and buyers are dispersed, separate events not easily compared. Hence the marketing of timber is different from the marketing of other products of the land. In the case of fruit, for example, two cooperatives or exchanges are located at Colfax and Placerville; they provide an organized market for fruit where many sales and purchases take place. The products are defined as to quantity and quality, and prices for different fruits and grades are well known. Most of the sellers are specialized producers with knowledge of their product,

⁵ Duerr writes that "...In marketing, the products of the forest are released for consumption. The aims of forest policy and the work of forest management are culminated and made to bear fruit. It is the character of the market, as a reflection of consumer's demands, that shapes forest management policies; and it is the efficiency of the market as a reflector of those demands that determines how well the goal of optimum benefit may be seen by the forest manager as an individual negotiator in the market..." p. 162.

market requirements, and marketing methods. Terms of sale are well defined.

Timber markets differ widely from this type of marketing. By its very nature, timber is fixed in place. Most sales are made at the stump, and products come from many scattered holdings. Small-forest owners usually are engaged in other activities for a livelihood. Timber is a variable commodity, not easily defined as to quality or quantity. Its value also depends partly on such factors as distance to processing plants and ease of logging. As a result there is no single market price generally applicable to every sale. The actual price often depends on the importance of a variety of factors, including the bargaining position of buyer and seller. And in timber sales, price alone is not an adequate measure of return to the seller. The way in which the timber is cut and the logging done affect values in the residual stand and land that are important to the land owner.

In the past, timber marketed by small-forest owners in the Central Sierra Nevada has largely been an unplanned "product of nature," the ownership of which often was incidental to the main objective of holding land. Because of this and other factors, small-woodland owners generally do not know much about timber and marketing. The current marketing pattern has developed in this scene and in response to an expanding industry. The extent to which this pattern provides equitable returns to woodland owners and the direct effect it has on the forest itself will partly determine the extent to which timber is intentionally grown and the amount that can regularly be harvested.

Research method

To obtain information on timber markets and marketing practices in the Central Sierra Nevada Region, detailed field interviews were conducted between July and November 1958 with a sample

of 145 owners of small forest properties less than 5,000 acres in size. Mail questionnaires were received from an additional 15 land owners whose residence made personal contact impractical, for a total of 160 sample owners.⁶ Information was also received through informal discussions with service foresters, consulting foresters, farm advisors and county officials, timber and mill operators, and other land owners not included in the sample.

For each sample owner, data were collected on ownership and forest characteristics and on the sales of timber for the six-year period 1953-1958. Timber sales were discussed in detail with each of the 55 owners who had made a sale, except for four owners who were contacted by mail. Information on the following was recorded on questionnaires: general sale characteristics, including year of sale, volumes and prices of products sold, point of sale, sales experience, distance to sawmills, length of haul, and reason for making sale; marketing practices, including buyer selection, method of finding buyer, price determination, knowledge of prices, contractual arrangements, method of payment, product measurement, harvesting method, and marketing assistance; and seller attitudes. Owners who had not made sales were questioned about their contact with the market and their reasons for not marketing timber.

Data were obtained for 68 separate timber sales made by the 55 owners, but

YEAR OF SALE	NUMBER OF SALES	PER CENT
1953	13	19
1954	11	16
1955	13	19
1956	8	12
1957	10	15
1958	13	19
Totals	68	100

⁶ See appendix, page 56, for marketing sampling method and adequacy of sample size.

not all questions were answered in each case. Consequently, the number of sales used in the analysis varies with the survey question. This is indicated where appropriate. Distribution of the sales over the study period was as shown in the table on page 31.

Sales Characteristics

Some general features of timber marketing on small forests include the extent of sales activity among owners, their experience in selling timber, products sold, reasons for selling, and location with respect to sawmill log markets.

Sales activity in the region adjusts to changing market conditions for lumber chiefly through changes in timber-buying activities of mill and logging operators. During the period of study the level of production was comparatively high, with a decline in 1954 and a sharp fall in 1957 (figure 2, page 17). The number of timber operators increased rapidly to a peak in 1955, then dropped equally as fast up to 1958. Therefore owners faced fluctuating demands for timber at a comparatively high level, except in 1957 when production fell to its lowest level since 1949.

The marketing activity of sample owners followed this pattern. As shown in the text table on page 31, a smaller proportion of sales were made in the recession years of 1954 and 1957. And of 160 owners interviewed, 55—or about one-third—had sold timber.

Types of owner selling. Most sales included in the study were made by owners with 180 acres or more, by nontimber interests, and by nonresident owners (table 9). Owners with less than 180 acres accounted for more than half the sample ownerships but for only about one-fourth the number of sales. Miscellaneous interests accounted for two-thirds of the ownerships but for only two-fifths of the sales. As this suggests, sales activity varied with each group. The proportion of owners selling timber in-

creased with increasingly larger ownership size; one-fifth of the owners with less than 180 acres sold timber, compared to nearly two-thirds of the owners with more than 700 acres. Activity by timber interests exceeded that of agricultural interests, who were in turn more active than miscellaneous interests. More than three-fourths of the owners whose major land interest was timber made sales, contrasted to one-fifth of the miscellaneous-interest group.

Sales activity also varied with location of the owner, and was related to the types of owners that constituted each residence group. The least active sellers were nonresidents living outside the region, a group which included mainly miscellaneous interests. Less than one-third of these owners sold timber, compared to 45 per cent of the nonresidents living inside the region. The main reason for the greater sales activity of this latter group was that nearly one-fourth of the group were in the timber-holding individuals classification.

Previous marketing experience and some familiarity with logging are important in developing timber-marketing abilities. Through the experience of making regular timber sales the timber owner remains in contact with buyers and sources of information on market requirements and prices. He can also develop skills in product measurement, price determination, and administration of the sale. However, timber on most small-forest properties is only an occasional product, and not the main purpose of ownership. Usually sales are made at irregular, infrequent intervals; many owners, therefore, are slow in accumulating experience, and have no contact with the timber market for considerable periods of time. Among the owners studied who had sold timber, for example, only one-fifth had made more than one timber sale in the six-year period 1953 to 1958. One owner had sold timber annually.

Table 9. Distribution of timber sales

A. By size of ownership

Size of ownership (acres)	Ownerships (number)	Timber sales made		Per cent of owners in each class selling timber
		Number	Per cent	
0- 179.....	95	19	28	19
180- 699.....	40	20	30	47
700-4,999.....	25	29	42	64
Totals.....	160	68	100	

B. By type of ownership

Type of ownership	Ownerships (number)	Timber sales made		Per cent of owners in each class selling timber
		Number	Per cent	
Timber.....	14	12	18	77
Agriculture.....	40	28	41	50
Miscellaneous.....	106	28	41	22
Totals.....	160	68	100	

C. By residence

Place of residence	Ownerships (number)	Timber sales made		Per cent of owners in each class selling timber
		Number	Per cent	
Resident, on the property.....	62	26	38	34
Nonresident, inside the region.....	33	21	31	45
Nonresident, outside the region.....	65	21	31	29
Totals.....	160	68	100	

As the table below shows, more than one-third of the sales were made by owners with no previous sales experience. An additional one-fourth were made by owners with experience in one earlier sale.

PREVIOUS SALES EXPERIENCE	NUMBER OF SALES	PER CENT OF SALES
None	26	38
One previous sale	19	28
Two or more previous sales	23	34
Total	68	100

Logging experience was uncommon among sellers. Nearly three-fourths (72 per cent) of the sales were made by persons who neither had experience in nor were familiar with logging methods. Owners in one-tenth of the sales were familiar with logging but had no experience with it. Logging experience usually accompanied sales experience. Of the sales made by owners without previous sales experience, only one-tenth were made by owners with some logging experience. By contrast, in sales made by

owners with two or more previous sales, more than half of the sellers also had logging experience.

This lack of timber-sale experience among small-forest owners often results from the fast rate at which these properties change ownership. A study of ownership changes in Mendocino County showed that two-thirds of the small owners had acquired their property between 1948 and 1958 (Casamajor, Teeguarden, and Zivnuska, 1960). Evidence of similar changes in the Central Sierra Nevada Region was obtained in this study: it was found that 47 per cent of 147 sample owners had acquired their property in the eight-year period since 1950. These ownerships included 36 per cent of the land area and 25 per cent of the commercial forest land in the sample. One-third of these owners had sold timber during the study period. Half of them lacked timber sale experience, whereas less than one-third of the owners who had held their property longer lacked such experience.

Point of sale. Stumpage was the usual form of product in the sales. With few exceptions, owners were not in a position to harvest their own timber and transport it to a mill. Because harvests are infrequent and owner interests lie elsewhere, small-forest owners rarely have the type of equipment and the technical skills to do their own logging. They usually have to sell timber on the stump. For much the same reasons, they may evaluate other uses of their equipment as more rewarding than logging, even if they own tractors and trucks large enough to handle heavy, large-size timber.

Approximately 95 per cent of the 68 sales studied were made on the stump. There were no sales of logs on the roadside, and only 5 per cent of the sales (3 out of 68 sales) were made by owners handling their own logging and selling the logs at the mill. One of these owners was a timber operator engaged in the business of cutting timber; one was a farmer; and the third had the logging



Logging in a mix-conifer forest. Small-forest owners in the Central Sierra Nevada Region generally sell stumpage and rely on logging operators to cut and remove their timber.

done by relatives who were in the logging business.

These marketing and logging practices emphasize the important position of the buyer as an agent in the management of small-forest properties. Buyers, through their logging methods, exercise considerable effect on forest stands. Sometimes they also advise owners on when to cut timber and which trees to remove. It is apparent, then, that both the marketing and the logging practices of timber buyers in the region have a major influence on the private, small-forest resources.

Size of sales. Sales of small volumes were typical; this characteristic of small-forest ownerships weighs heavily on the kind of marketing arrangements the owner can make. An indication of how small sale volumes may determine the owner's approach to timber marketing was illustrated by the comment of several owners who had turned down offers for their timber because "there just wasn't enough timber to bother messing with."

Here is the distribution by size class of 47 small-forest timber sales:

SIZE OF SALE M Bd. ft.	PER CENT OF SALES
100 or less	36
200-500	37
600-900	9
1,000 or more	18
Total	100

As can be seen, nearly three-quarters of the sales were of volumes of 500,000 board feet or less. Harvested volumes ranged from as little of 40,000 board feet up to 5 million board feet. The average volume sold was 570,000 board feet.

However, even though most owners marketed small volumes, gross receipts from the timber sale were often comparatively large. For some owners income from the timber sold amounted to a substantial portion of total annual income. As table 10 indicates, over half of 38 sales for which both volume and price data were available brought in cash payments of \$2,000 or more. A third were

Table 10. Distribution of small forest timber sales by total value of sale, Central Sierra Nevada Region, 1953-1958

Total value of sale (dollars)	Sales	
	Number	Per cent
Less than 999	8	21
1,000- 1,999	10	26
2,000- 2,999	6	16
3,000- 4,999	2	5
5,000- 9,999	6	16
10,000-14,999	3	8
15,000-19,999	1	3
20,000 or more	2	5
Total	38	100

for total payments of \$5,000 or more. These 38 sales averaged \$6,749 per sale, and ranged from \$150 to \$83,430.

This indicates that even though small sales are characteristic of small-forest properties, receipts are often sufficiently large to justify the seller in spending considerable time on timber marketing and possibly employing outside technical assistance.

Proximity to sawmills. The distance of 133 small-forest ownerships to the nearest mill is shown below:

DISTANCE IN MILES TO NEAREST SAWMILL	PER CENT
0-5	55
6-10	29
11-15	8
16-20	8
Total	100

Also shown is the distance of 130 small-forest ownerships to the second nearest sawmill:

DISTANCE IN MILES TO SECOND-NEAREST SAWMILL	PER CENT
0-5	26
6-10	38
11-15	17
16-20	10
21 and more	9
Total	100

These two tables show that 55 per cent of the properties for which data were obtained had at least one sawmill within five miles; more than four-fifths were located within 10 miles of a mill; and two-thirds were located within 10 miles of at least two sawmills. Such nearness to sawmill-log markets and easy accessibility afforded by an established road system add to small-forest timber values.

In many cases the forest owner or timber buyer chose to bypass the nearest mill or mills to sell the logs elsewhere. The extent of this in the small-forest timber market is given here for 56 small-forest timber sales:

LOCATION OF MILL		PER CENT
RECEIVING LOGS		
Nearest mill	59	
Second-nearest mill	18	
Mill further away	23	
Total	100	

The 41 per cent of the sales in which logs were transported to mills beyond the nearest mill, totaled one-fourth of the volume sold. The distribution of 56 sales by length of haul is shown:

LENGTH OF HAUL		PER CENT
IN MILES		
0-5	27	
6-10	27	
11-15	9	
16-20	20	
21-25	3	
26-30	5	
31 and over	9	
Total	100	

Cross-hauling may result from mill-price differences, preference of the timber buyer to deal with a particular mill, existing financial arrangements between the buyer and mill, or special requirements of particular mills. Since forest owners are seldom directly concerned with the question of where logs are taken, cross-hauling results mainly from the decisions of timber buyers. Under certain conditions of market price and transfer costs, cross-hauling reflects inefficient

choice of markets. Its extra costs result in lower prices to forest owners or in smaller profits to timber buyers. Both may share the loss, but it is more likely that the forest owner, as the weaker bargaining agent of the two, would realize the larger loss. However, some degree of cross-hauling is probably unavoidable and reflects the existence of competition among buyers.

Reasons for marketing timber.

The factors motivating an owner to sell timber may influence his attitude toward the sale, and hence affect his marketing practices and arrangements. An owner who makes an unplanned sale simply because of an opportunity to sell, for example, will tend to accept whatever price the buyer offers rather than establish price by inviting offers from several buyers.

Here are the main reasons given for making sales in 67 small-forest timber sales:

PRIMARY REASONS FOR MAKING SALE	PER CENT OF SALES
Opportunity to sell	23
Clear land for other uses	20
Timber mature	18
Addition to regular income	16
Needed cash for home expenditures	5
Improvement cutting	5
Regular periodic cut	3
High current prices	3
Emergency cash needs	1
Relieve tax burden	—
Other reasons	6
Total	100

Taken together, financial considerations were the principal reasons owners gave for deciding to sell timber. Including opportunity to sell, desire for additional income, need of cash for home expenditures, emergency cash need, and high prices, financial factors accounted for nearly half of all reasons given for marketing timber. None of the owners indicated the property tax on timber was a factor governing their decision to sell.

Another fourth of the sales were prompted by silvicultural considerations of the forest itself, pointing to a limited but still recognizable interest among owners in forest management, mainly as it concerns the cutting of the timber near stand maturity. One-fifth of the sales cleared the land for other uses, indicating that some owners are choosing to substitute other forms of land use for timber growing.

The most frequently mentioned reason for selling was that the owner had received an offer from a buyer. Hence, in many sales the decision to sell was prompted largely by accidental opportunity rather than by some previously determined factor. In some cases, owners did not know their timber was merchantable until an operator made an offer to buy it. Attitudes of a few owners were represented by statements to the effect that they thought, "I might as well get the money out of it while there is a buyer around who wants it." Some owners were unaware of or simply uninterested in the possibilities of growing timber as a cash crop. The high percentage of sales in response to an opportunity to sell also indicates that the marketing contacts of many owners are limited.

Although clearing forest land for alternative land uses was the second-highest reason for cutting and selling timber, such sales did not actually result in the removal of all timber. Usually the buyer cut all timber that could be removed at a profit. Most of the sales were made by ranchers who wanted to convert from forest to grazing uses. In two instances, forest land was being cleared for a highway right-of-way, while in another the owner was planning to establish a Christmas-tree plantation. Whatever the underlying reason, the fact that one-fifth of the sales in the study were made to clear land suggests that withdrawal of forest land from timber production is a significant factor affecting the future status of the forest resource.

Market organization. Buyers of stumpage and logs in the region include independent timber operators and operators of sawmills. Timber operators purchased standing timber from land owners and in turn sold logs to mill operators. Some mill operators did not conduct logging activities themselves but instead relied entirely on buying logs from independent loggers or contracting with them for logging purchased stumpage and hauling the logs to the mill. The transporting of logs was often performed, however, by an independent hauler who also operated under contract with the mill owner. Some buyers conducted both mill and logging operations; often mill and independent timber operators worked together under verbal or written agreements whereby the logger undertook to locate and purchase stumpage and to deliver the logs to the mill, while the mill owner scaled the logs and paid both the land owner and logger for delivered material. In some cases the mill advanced credit to the timber operator to finance his operations. Other loggers were strictly independent operators, financing stumpage purchases themselves and selling logs at various mills depending on prices and the product.

In selling timber, the owners in the study made 52 per cent of the sales to independent timber operators and 48 per cent to mill operators who either logged themselves or else contracted to have the logging done by an independent operator. Over half the sales made to mill operators were made to small mills producing from 1.0 to 9.9 million board feet annually; nearly two-fifths were to

SIZE CLASS OF MILL PURCHASING TIMBER <i>Million Bd. ft.</i>	PER CENT OF SALES
Less than 1.0	4
1.0-9.9	57
10.0-24.9	7
More than 25.0	32
Total	100

medium and large size mills, principally the latter, producing 10.0 million feet or more. The distribution is shown on page 37 for 28 small-forest timber sales.

To sum up, the timber market in the region is composed of relatively many forest owners, few buyers, and still fewer mills. Because of topography and other factors which naturally allocate producing areas to particular plant locations, the region is actually divided into a series of timbersheds supporting from one to eight or more sawmills. Thus on the timber side of the market there are many primary producers and sellers, while on the log-buying side the number of buyers active in any given area is limited.

Marketing practices

The structure of timber marketing on small forests in the Central Sierra Nevada Region must be described as disorganized. A number of factors work against the establishment of common sales methods and meaningful, well-known market prices. Tracts of timber vary in value, depending on location, character, and ease of logging. Since standing timber is fixed in place, and most sales occur at the stump, market transactions take place at scattered locations under dissimilar circumstances. Sellers are unspecialized producers whose varying attitudes and interests result in a wide range of sales practices. Products vary in both quantity and quality, and are often measured by different methods. With so variable a commodity as standing timber, grading would serve a useful purpose: it would define products on the basis of physical characteristics which determine their value in end uses. This would in turn help establish more accurate prices and reduce risks attached to present uncertainties. Yet, in sales between stumpage owners and timber buyers logs are not graded, and quality is left to judgement when the selling price is determined.

Small-forest owners generally are not familiar with their product nor with marketing methods; they also lack constant, close contact with the market and with timber buyers. In many cases, lack of market contact, small volume, and the effect of transportation costs on defining market area make it difficult to attract more than one or two potential buyers at a particular time. As a consequence, timber is frequently sold after negotiating with only one buyer, who often treats the purchase as an isolated case with the objective of negotiating the sale for the lowest price, and who usually has a much clearer picture of current market conditions and timber values than the seller. Although most sellers professed general knowledge of prices, the prices they actually received varied widely, thus refuting the general usefulness of such information as "the going price."

In this situation the buyer assumes the dominant position in the market through initiating sales and conducting harvesting operations. The buyer-seller relationship is characterized by a striking degree of informality in arrangements. It is through the buyer, as a market agent, that the forces of supply and demand are transmitted to forest owners. The owner, as a seller, is commonly a passive marketing agent whose fortunes depend on the opportunities offered him by occasional contacts with a buyer.

This situation often causes marketing problems for the owners of small forests. Many of these problems can be overcome by more informed marketing methods. The following analysis of alternative marketing practices shows the basis for developing more effective marketing methods. The discussion emphasizes the marketing of stumpage, as this was the main form of product. The three sales of logs at the mill are omitted.

Finding and selecting the buyer probably are the two most important pre-sale activities of small-forest owners. Because of the manner in which timber is

sold, both are closely related and in many cases combined. How sellers found and selected a buyer was principally determined by the extent and nature of their market contacts, their own efforts to make the sale, and a number of interpersonal relationships.

The passive role of owners in finding a buyer is indicated here:

METHOD OF FINDING THE BUYER	PER CENT OF SALES
Buyer contacted seller	61
Previous business relationship	13
Seller contacted known buyer	10
Through third party	10
Seller inquired at local mills	3
Seller contacted buyer working nearby	3
Total	100

In nearly two-thirds of the 61 cases investigated, the sale was initiated by the buyer. Rather than the owner seeking a buyer for his products, the buyer came to the owner with an offer to purchase timber. The second most frequently mentioned method of finding a buyer was that the two principals were already known to each other through a previous or existing business relationship. In most such cases earlier sales had been made and the arrangement continued. Less than one-fifth of the sales were initiated by the seller, usually with a buyer already known. In a few cases the seller inquired at local mills or offered timber to a buyer operating nearby.

The reason for selecting the buyer is given here for 62 stumpage sales:

REASON FOR SELECTING THE BUYER	PER CENT OF SALES
Only buyer known	22
Best offer	20
Personal friendship	15
Previous business relationship	15
Good reputation	10
Buyer was working nearby	6
Relative	3
Buyer would pay seller's price	3
Other reasons	6
Total	100

Lack of market knowledge and its influence on buyer selection was shown in one-fifth of the sales where the buyer selected was the only one known. This was true either literally or it meant that the buyer was the only one known who was interested in buying the timber. Personal friendship and previous business relationships resulted in buyer selection in one-third of the sales. Here confidence in the buyer was often an important, implicit consideration. "Good reputation" was the chief reason for selecting the buyer in one-tenth of the sales. Actually most sellers dealt with no more than one buyer. In only one-fifth of the sales did sellers select a buyer on the basis of the highest price from two or more offers. Taken together, nonmonetary factors (only buyer known, personal friendship, previous business relationship, good reputation, buyer working nearby, and buyer being a relative) were the reasons given for selecting the buyer in 71 per cent of the sales.

Evaluation of and reliance on factors other than price are highly important in timber marketing, a fact well recognized by successful timber sellers. The sale of standing timber is much more than a simple exchange of a commodity. The buyer enters the property of the seller and carries out the logging operations. The effect of the logging on the residual stand and balance of the property, the protection of physical improvements such as roads and fences, and the accuracy of scaling procedures can have a great impact on the net benefits of the sale to the land owner. Selection of a competent, cooperative, and reliable buyer is thus of the greatest importance. This does not mean that selection of a buyer on such a basis necessarily means a lower price. Findings of this study indicate that the opposite is true: sales in which the buyer was selected on the basis of good reputation, personal relationship, and previous business relationship tended to have higher selling prices than

sales where the buyer was the only one known. Furthermore, prices were equally as high as in those cases where the buyer selected had made the highest of two or more offers.

Although competitive bidding would presumably raise the purchase price, such bidding was completely absent as the basis for buyer selection during the period of the study. The reason for this seems to lie in the difficulty of attracting several buyers, the attitudes of owners toward marketing, or both. Effective use of competitive bidding requires careful advance preparation of the sale. Obtaining bids from several buyers requires expenditure of time and some money. Information on the size of the sale area and on the volume, species, and condition of the timber to be sold must be collected and bids invited through advertising or personal contact. Prospective bidders must be shown the sale area, and bids must be received. Provision for adequate supervision of the sale becomes of great importance, since the buyer is selected solely on price considerations. All these activities may be carried out by a consulting forester if the owner himself is unable to handle them effectively. However, advance preparation of the sale even to the extent of first ascertaining the volume to be sold is very uncommon, and relatively few owners obtain assistance in these matters about which they often know little. Evidently, the requirements of competitive bidding are greater than the time and effort owners are willing to devote to marketing.

The practice of selecting the buyer on the basis of "best offer" in a fifth of the sales may be considered a partial substitute for competitive bidding. In several sales of this type, the seller invited selected buyers to tender offers, finally accepting the highest offer. The buyers asked to make offers were usually chosen on the basis of their reliability. Commonly two offers were received, but in one case six buyers made offers. Just as

frequently, however, the owner had received a number of unsolicited offers to buy over a period of time. The last of these was considered a "high offer" and accepted. One shortcoming of this method is that changing market conditions may invalidate comparing one price offer with another.

Methods of determining price assume especial importance in a market characterized by lack of competitive bidding, wide variations in the conditions of the sales, and no generally applicable market price. The passiveness of the sellers, their lack of price knowledge, and the dominant market position of timber buyers tend to result in the buyers' determining the price in most sales, as indicated:

METHOD OF DETERMINING PRICE	PER CENT OF SALES
Single buyer's offer	51
Highest offer	20
Negotiated price	16
Seller's asking price	8
Highest bid	—
Other	5
Total	100

In more than half the sales, price was determined by the offer of a single buyer. The next most important method, highest offer, meant that the seller selected the buyer and established the sales price on the basis of two or more offers. In about a sixth of the sales, the seller and buyer reached an agreement on price after bargaining.

The seller's general knowledge of timber prices is clearly important in such methods of setting prices. Findings of the study indicate such knowledge is apparently widespread; in some five-sixths of the sales the owners claimed knowledge of current prices (text table page 41). Where the sale price was negotiated, all sellers had knowledge of price; in cases where price was the highest of two or more offers, nine-tenths possessed price information. Those sales where price was determined by a single buyer

showed the largest proportion of sellers without knowledge of price; in one-third of such cases, sellers indicated they were not familiar with current prices being paid for standing timber. Presumably the price offered by the buyer in the remaining two-thirds of the sales was acceptable to the seller on the basis of his own knowledge of price.

There is no price-reporting agency in the region which publishes at frequent, regular intervals the results of transactions between private owners and timber buyers. *Markets for Woodland Products in California* has been published at approximately two-year intervals by the University of California Agricultural Extension Service and the California Division of Forestry, in cooperation with the California Small Woodland Council. These reports contain average prices and range of prices for second-growth stumpage, sawlogs and peeler logs delivered at the mill, and other products, for the different species and counties. Included also are lists of buyers of woodland products in the counties. These reports are prepared primarily for the use of farm advisors, state service foresters, and other technicians advising and working with woodland owners on the marketing of forest products and are distributed to owners only on specific request. Generally the owners did not appear to be familiar with these reports.

How price information was obtained by forest owners in 61 sales is shown here:

SOURCE OF PRICE INFORMATION	PER CENT OF SALES
No presale knowledge of price	18
General knowledge—no specific source	31
Local buyers or mill	31
Friend or neighbor	8
Industrial association, Forest Service, and private stumpage sales	7
Forester	3
Other sources	1
Total	100

In two-fifths of the sales in which the seller had knowledge of price, the source was nebulously described as "general knowledge" obtained informally through other individuals and hearsay. This information was usually described as "the going rate," "market price," or "what others were getting." Local buyers and mills were the sources of price information in an additional two-fifths of the sales.

Though there is an indication that a "market price" exists, as noted before, actual prices received in the sales studied varied widely. Thus it is apparent that "the going rate" market price is at best a very rough approximation of timber values at a particular time. For this reason, determining price on the basis of competitive bidding, best offer, or bargaining, is important in adjusting these approximations to reflect individual sale conditions.

The influence of the region's largest single seller of timber, the U.S. Forest Service, was apparent in price determination to a limited extent. Owners in four sales (7 per cent of all sales) stated that prices paid for national forest stumpage were considered in forming price. Usually this information was combined with prices from private sales in working out the final selling price. In one case the agreed price was the Forest Service's regional average. There were a few additional sellers who had knowledge of federal stumpage prices and who were troubled over difficulties in reconciling them with what buyers were willing to pay.

Once the buyer has been chosen and the price agreed upon, the seller and buyers must come to an understanding on the physical and legal aspects of the transaction. The sale contract should play an important role in clearly defining the arrangements of the sale and in assuring a satisfactory transaction.

Timber-sale contracts, however, have been strikingly characterized by im-

formality. Here is a distribution of the type of contract for 63 sales:

TYPE OF SALE	PER CENT OF SALES
CONTRACT	
Verbal agreement	46
Buyer's written contract	32
Seller's written contract	13
Jointly written contract	6
Other	3
Total	100

According to these findings, verbal contracts were used as often as were written contracts. The reasons sellers tend to rely on verbal arrangements and contracts provided by buyers include the casual approach of many owners to timber marketing; the preference for keeping the sale on a friendly, informal basis; and the cost of having a contract prepared.

A timber-sale contract is an important feature of a stumpage sale. As a legal instrument, it establishes the rights, liabilities, and performance requirements of buyer and seller, and thereby acts to protect the interests of both parties. Such a contract can also be a useful tool in forest management, as specific provisions can cover method of logging, fire prevention, selection of trees to be cut, and slash disposal. The case for a written sales contract is well stated in the California Pine Region Handbook (Craig and Maguire, 1949) written for timberland owners: "A written sales contract is necessary to protect the land owner from the occasional unscrupulous buyer. . . . Perhaps more important is its service in removing the possibility of honest misunderstanding, for the contract is a record of agreed-to conditions of sale." This study showed that seller dissatisfaction with the sale was greater when verbal arrangements were made than when the agreement was written.

Verbal agreements cannot adequately provide for the important legal and physical aspects of timber marketing. Considering the wide use of verbal contracts and the points omitted from many

written contracts, these aspects are evidently casually regarded or overlooked by most owners. Few sellers were familiar with timber-sale contracts or sought legal counsel or professional forestry advice. Usually agreements included only the price, method of payment (lump sum or scale), and the timber to be cut (for example, "all merchantable trees" or "all trees 20 inches in diameter and larger"). Important sale aspects not covered in such sale agreements included the following:

- Definition of timber to be cut and utilization standards.
- Scaling method to be used.
- Time limit for removal of purchased timber.
- Liability for taxes between time of purchase and time of cutting.
- Time at which title to the timber passes from seller to buyer.
- Assignability of the contract.
- Liability for loss in event of fire or other catastrophe.
- Responsibility for slash disposal.

Loose verbal arrangements or poorly written contracts may result in financial loss and dissatisfaction with timber buyers and timber growing. In about one-fifth of the sales in which the contract was verbal or written by the buyer, the seller didn't feel the buyer had complied with their agreement and was dissatisfied with the sale. Sellers who provided a written contract were generally satisfied with buyer performance. This points up the advantages to the seller of defining his terms of sale and securing the buyer's formal agreement. Some of the problems sellers complained about included the following:

- Buyer failed to provide scale tickets in support of payments.
- Buyer did not cut all timber contracted for, leaving timber difficult to log.
- Timber marked as leave trees was cut in violation of the agreement.
- Buyer failed to dispose of slash as agreed.
- Buyer failed to make road improvements as agreed.
- Buyer did not pay for all timber removed.

In general, however, owners felt the buyer has complied with their agreement and considered the logging to be either good or satisfactory. A small number of owners—including 12 per cent of the sales—were perturbed chiefly over what they considered to be excessive damage to the residual stand and to the land. Some complained of damage to fences, others of the buyers' failure to dispose of the slash as they had agreed.

Some problems sellers encountered in selling their timber arose out of their failure to administer the sale after the agreement had been made. In 34 per cent of the sales, owners had not checked on the logging nor seen their property either during or after the sale. In 32 per cent of the sales owners had checked the sale area from one to five times during the period of logging, and in 34 per cent, more than five times.

Method of payment for standing timber was based on determination of the volume in harvested logs (scaling) in over four-fifths of the sales. Usually this was done by the buyer, by the mill to which the buyer in turn sold the logs, or by both (table 11). Few sellers participated in these activities.

Scaling is well established throughout the logging and marketing system. In sales of standing timber, scaling is preferred because of the belief that it provides a definite measurement of the amount of timber actually sold. Local mills purchase logs from timber operators on the basis of scaled volume, frequently providing the landowner with copies of the scale tickets covering logs harvested from his property. Logging crews are also commonly paid on the basis of output as determined by scaled volumes.

In selling standing timber by log scale, payment is based on a stumpage price per thousand board feet and the scale of the logs as they are removed from the property. The buyer may make payments

weekly, biweekly, or monthly as the timber is removed, using scale tickets from the mill receiving the logs or his own statement of the scaled volume as evidence of the amounts taken.

Although mills buying logs generally recognize differences in log quality (grade),⁷ and pay accordingly, grading is not commonly practiced in the stumpage market. In all the sales studied, a single price was paid for all logs regardless of quality differences. However, when this price is established recognition is presumably given to the grade of logs which the property will yield. Payments usually differed according to timber species, but sometimes the price was the same for all species.

⁷ Logs are sometimes purchased on a "woods-run" basis, i.e., a single price is paid for all logs of a given species.

Table 11. Distribution of 63 small forest stumpage sales, by basis for payment, Central Sierra Nevada Region, 1953-1958

Basis for payment	Per cent of sales
Lump sum	
No volume determination.....	5
Buyer's estimate.....	5
Seller's cruise.....	5
Buyer's cruise.....	3
Subtotal.....	18
On scale	
Buyer's scale.....	38
Mill's scale.....	21
Buyer's and mill's scale.....	18
Buyer's and seller's scale.....	2
Buyer's, mill's, and seller's scale.....	2
Third party hired by buyer and seller.....	2
Subtotal.....	82
Total.....	100



The scaled volume of the logs is the basis for payment in most timber sales. In small sales scaling is usually done by the buyer or the mill where the buyer sells the logs.

Evidently the payment for timber on the basis of scaling has proved satisfactory to most sellers, but in only half the sales (53 per cent) did owners know how the logs were scaled. For some sellers scaling and payment on scale involved certain problems. Several complained that the buyer failed to support payments with scale tickets establishing the volume of timber cut and removed. A few others alleged that the buyer hauled logs to two different mills, but submitted only the scale tickets and payment for logs taken to one. Payment on a scale basis also encourages the high-grading of stands and the leaving of marginal and low quality logs on the ground unless the sales specifications are carefully drawn in the contract and adequate supervision of the sale is provided. However, none of the sellers complained of high-grading, and only one of the leaving of too much material on the ground.

Participation by the seller in the scaling is desirable to protect his interests, but with limited volumes and intermittent

operations there are practical limitations on what can be done. This, combined with lack of knowledge of scaling methods and the generally inactive role of owners in marketing timber, would appear to explain the fact that the owner was represented in the measurement in less than 6 per cent of the sales on a scaled volume basis. In the majority of sales both the method of measurement and the quantity sold were determined by the buyer.

The Scribner log rule is in general use throughout the region. It is the official rule of the U.S. Forest Service, and was used in all the sales studied. Thus there were no problems in log measurement because of different log rules. However, the practices under which the rule is applied are important and can become a difficult problem. Most buyers of stumpage cut long logs to reduce costs of logging and transportation to the mills. These long logs of 20, 24, 32, and even 40 feet in length may be scaled either on a "long log" basis, with scaling as a single log based on the diameter of the

small end and with no allowance for taper, or on a "short log" basis, with scaling of two or three sections of the log and recognition of the effect of taper on the scaling diameters of these sections. Figure 8 shows that, for 32-foot logs, "long log" scaling will give volumes at least 5 per cent less than "short log" scaling, while for logs in the smaller range of top diameters such as are cut from younger timber the differences range from 10 to 15 per cent or more. Moreover, although log lengths provide a particularly striking example of the effects of scaling procedures, they are only one of a number of variables in scaling practice which can have an appreciable effect on the total log scale reported.

Such matters as maximum log length scaled, utilization standards, and defect allowances were rarely covered in sale agreements, generally following the customary practices of buyers. Half of the 53 per cent of sellers who knew how the logs were scaled said maximum log length scaled exceeded 16 feet. If the effects of these practices are recognized, appropriate adjustments can be made in the price per thousand feet, but generally

the sellers did not appear to realize the importance of scaling procedures to the actual price received.

Lump-sum payments based on some type of estimate of the total volume of standing timber were found in less than one-fifth of the sales studied (table 11, page 43). In half of these lump sum sales the volume on which payment was based was determined by a cruise involving the tallying of timber volumes on sample areas, while in the remaining half payment was based on rough ocular estimates or similar approximations. Payment was normally made as cash in advance. In most such sales the volume of timber actually removed is uncertain.

Lump-sum sales based on inadequate knowledge of timber volumes are obviously subject to abuse, and the method has sometimes been held to be unsound. However, a lump-sum sale based on a careful tally or cruise of the timber to be sold and subject to adequate contract provisions and supervision can be an effective method of selling timber. This is especially the case for small or intermittent sales in which the volume handled does not warrant the cost of super-

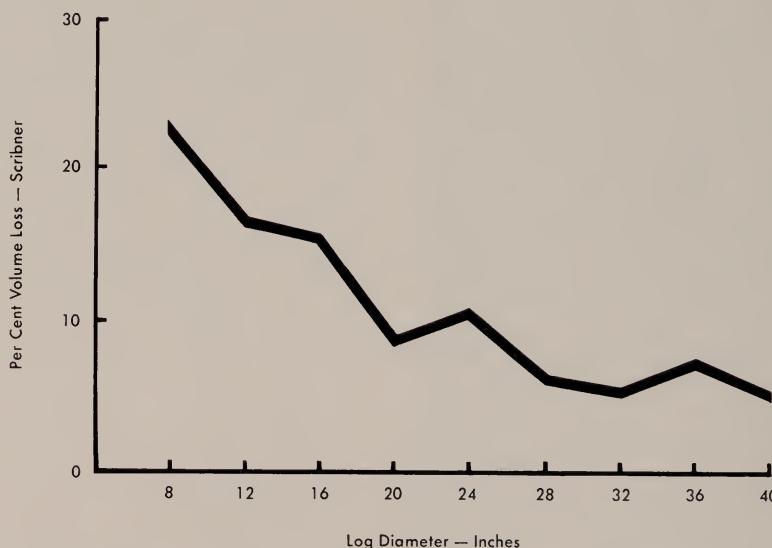


Fig. 8. Per cent of 32 foot log scale lost if log is scaled as a single log instead of as two 16-foot logs (taper 1" per 8').

vision of scaling by the seller. Reasons for selling on a lump-sum basis that were noted in the study included lack of knowledge of alternative methods, the preference for cash in advance, and the wish to save the time required to supervise scaling. One land owner felt scaling practices were so dishonest that it was financially more desirable to sell for a lump sum in advance on the cruised volume.

Timber-cutting practices in the region are broadly governed by the State Forest Practice Rules, which set up minimum acceptable practices for the purpose of keeping timber land in productive condition. The northern part of the region, including most of Nevada County, comes under the North Sierra Pine Forest District rules (California Division of Forestry, 1954), while the southern area is in the South Sierra Pine Forest District (California Division of Forestry, 1954). The forest practice rules were developed by a committee of forest land owners and operators in each district following public hearings, and were given force of law by action of the California State Board of Forestry in 1947. The rules for the northern district were revised and strengthened in 1953, those for the southern district in 1954.

Rules for the North Sierra Pine Forest District specify that all thrifty, immature ponderosa pine, sugar pine, Jeffrey pine, incense-cedar, white fir, Douglas-fir, red fir, and western white pine trees that are not at least 20 inches d.b.h. shall be left uncut in sawlog and veneer-log operations. If products other than these are being cut, a well-distributed stand of sound and thrifty trees is to be left in accordance with one of several requirements given in the rules. Separate provisions apply to lodgepole pine stands.

Rules for the South Sierra Pine Forest District establish different requirements for old-growth and young-growth timber. In the case of old-growth areas, all

sound immature trees 22 inches d.b.h. or less are to be reserved and left uncut for future crops; an average of not less than three satisfactorily located seed trees 18 inches d.b.h. or larger are to be left per acre. In addition, no area is to be more than one-eighth of a mile from seed source, unless it is adequately stocked. Provisions applying to areas of young-growth or prior-cut timber harvested for sawlogs or veneer logs state that all sound, immature trees of 18 inches d.b.h. or less shall be left uncut. Seed-trees and seed-source requirements are the same as for old growth. If products other than sawlogs or veneer logs are cut, an adequately stocked stand is to be left.

In addition, rules for both districts establish minimum logging practice standards, hazard-reduction practices, fire-prevention and fire-suppression practices, and practices for protection against forest insects and diseases.

Under the customary marketing arrangements between buyers and sellers, details of cutting practices were not ordinarily defined in sale agreements, except in general terms. Therefore in most sales the forest practice rules constituted the only written provisions governing cutting practices that had legal stature. The rules seemed to be generally well known by timberland owners, and many sellers relied on them as guides governing the buyer's harvesting of timber on the sale area, especially in such matters as minimum-cutting diameters and slash disposal. To some extent, at least, it appears that the rules have been taken by many land owners as represent-

BASIS FOR CUTTING	PER CENT OF SALES
Diameter limit	62
Buyer's choice	12
All merchantable timber	12
Marked timber	10
Clear cut required	2
Other	2
Total	100

ing good forest practices, rather than as minimum standards beyond which there may be better alternatives.

The basis for cutting in 60 sales is given in the text table on page 46.

About two-thirds of the sales were based on cutting diameter limit; in three-fourths of these sales, the diameter specified was that established by the district forest practice rules, while in the remaining sales a larger minimum diameter was set. "Buyer's choice" and "all merchantable timber" were the basis for one-fourth of the sales, while timber was marked for cutting according to management objectives or silvicultural needs in only one-tenth of the sales.

Heavy cutting was the prevailing result of harvesting arrangements, as can be seen from the following table:

TYPE OF CUTTING	PER CENT OF SALES
Heavy partial cut (more than 40 per cent of volume)	50
Light partial cut (less than 40 per cent)	34
All merchantable trees	13
Clear cut	3
Total	100

In two-thirds of the sales from 40 per cent to all the merchantable volume was removed. Although the reason for selling in a fifth of the sales was stated to be land clearing, a clear cut actually resulted in only 3 per cent. In the remaining cases, only currently merchantable timber was removed.

The practice of heavy cutting apparently meets the preferences of both buyers and sellers. Timber operators favor heavy cutting so that fixed operating costs can be spread over as large a volume as possible. This preference is often shared by timber owners who desire the maximum sale income, sometimes regardless of the impact of heavy cutting which reduces returns over longer periods of time. Many owners, unfamiliar with timber growing and sell-

ing, are unaware that cutting alternatives other than those usually offered are possible and perhaps even more desirable. Custom, as modified by the forest practice rules, is a strong factor in determining timber-cutting practices. Undoubtedly the rules have protected the interests of many timber owners who through lack of knowledge would be unable to devise and enforce cutting methods that would keep their land in a productive condition, but such reliance on the rules has sometimes gone beyond the intent of the standards established.

Technical assistance in forest management and marketing is available to small-forest owners in the region from several public and private sources.

Public sources include county farm advisors at Placerville, Auburn, and Grass Valley who provide, upon request, general information and advice for farmers and other rural land owners, and have various publications concerning forestry and timber marketing. Soil Conservation Service advisors are also available in the region for dealing with problems of soil classification and land use. On land best adapted to growing timber crops, the advisor can provide assistance and advice covering a variety of forest-management tasks. Throughout the period of study a California Division of Forestry service forester headquartered at Camino in El Dorado County was available to timber owners in the three counties, and since 1957 a second service forester with headquarters in Sacramento has been assigned to Placer and Nevada counties.

The service forester provides on the ground advice or assistance concerning forest management, including timber marketing. This marketing assistance covers such matters as volume determination, marking timber for cutting, finding and selecting a buyer, price information, contractual arrangements, and administering the sale. The function of the service forester is to develop the owner's interest in forest management,

advise and assist him in initiating management practices, supply needed information, and to encourage him to follow good forest practice. The direct conduct of these activities is carried out by the owner, not by the service forester.

Private consulting foresters may be retained on a fee basis, usually 5-15 per cent of gross sale receipts depending on services and size of sale, to handle forest management activities for the timber owner. Consultants offer a full range of technical services, including forest inventory, management planning, and sale administration. Many such consulting foresters have had wide experience in timber marketing and are highly qualified to carry out the entire sales operation for the owner.

The value of advice and assistance to the forest owner marketing timber was demonstrated in several sales studied. Yet owners in 67 per cent of the sales obtained no marketing assistance. The third of the owners who had technical assistance in making the sale received help from the following: private cruisers—8 per cent; lawyers—8 per cent; friends—6 per cent; consulting foresters—5 per cent; service forestry program—3 per cent; others—3 per cent.

The kind of assistance owners received was established for a sample of 20 small-forest stumpage sales, and is shown here:

KIND OF ASSISTANCE	NUMBER OF SALES	PER CENT OF SALES
Volume determination	8	33
Price information or advice	4	17
Aid with contract	4	17
Deciding if cut should be made	3	13
Locating the buyer	2	8
Marking timber	2	8
Sale administration	1	4
Total	24*	100

* Totals more than 20 because of multiple answers.

Why was assistance in marketing not sought to a greater extent? The most obvious explanation lies in the fact that in 51 per cent of the sales made without assistance the owner did not know such services were available. These sales included a third of those studied. Several of these owners stated they would have asked for assistance had they known it was available. Forty-nine per cent of the sales made without assistance were made by owners who knew such help could be obtained, but who had not requested it. In several instances such owners were bluntly skeptical that assistance would be of value to them while in others the most apparent reason seemed to be a lack of awareness that such services might be of value. To these several explanations may be added the reluctance of sellers to pay for such services (although the sale income was often large enough to justify such a cost) and a lack of interest in marketing timber.

Variations in sales practices

Attitudes and interests regarding forest land vary according to type, size, and purpose of ownership. The marketing practices of particular groups are summarized here in terms of their differences from the general pattern of small-forest timber marketing. Emphasis is placed on type of ownership (see definitions, page 13) because this classification is easily recognizable and shows more pronounced variations in marketing practices than groupings by size.

Among types of owners. *Timber interests* as a special ownership group includes mainly individuals and companies whose major interest in the land was holding timber for sale to others (no timber-operating companies were included in the study). In several cases the land was used for other purposes as well, particularly grazing. This group was more active in marketing timber than other interest-groups but the proportion

Compared to the general pattern, timber interests more frequently:

- Provided their own written contract
- Knew the buyer
- Selected the buyer primarily on basis of price considerations
- Established price by accepting the highest offer or asking for their own price
- Received outside technical assistance
- Made lump-sum sales
- Cut on basis of diameter limit
- Made heavy cuts
- Felt buyer had complied with the contract.

Compared to the general pattern, agricultural interests more frequently:

- Sold on the basis of verbal agreement
- Knew the buyer
- Selected the buyer on basis of nonprice considerations
- Negotiated with the buyer on selling price
- Had previous sales experience
- Sold on scale
- Did not have outside assistance
- Cut all merchantable timber
- Were satisfied with the logging
- Felt buyer had complied with the agreement.

of owners with previous experience in selling timber was no greater.

Timber-interest owners tended to make more advantageous marketing arrangements than did other types. Their knowledge of timber and marketing methods distinguished their position in the market from other sellers. They generally were familiar with existing markets and potential buyers, and frequently relied on outside assistance in making timber sales. Associated with greater knowledge of the market was a tendency to rely more heavily on price considerations in selecting the buyer. As a result of these various factors, timber interests were usually able to conclude sales with which they were satisfied.

Agricultural interests as a group includes livestock ranchers and other, primarily fruit, farmers. Livestock ranchers held the largest proportion of land area in the group, nearly two-fifths of which was commercial forest land suited to growing timber. Generally this land is grazed along with the rest of the property. Timber is, of course, a secondary enterprise, although an important one when a sale is made.

Agricultural-interest owners sold timber on the basis of more informal arrangements than was the general case. Verbal agreements, for example, were

more common. Personal factors figured prominently in market contacts and in the selection of buyers. A larger proportion of the owners had previous experience in marketing timber than was true of other owners, and there was greater reliance on scaling in determining volumes sold. Greater informality in selling timber was apparently related to the comparatively more intimate relationship agricultural interests had with the market and to some extent to lack of interest in timber activities. Half the sales made by the group were made with the intent of clearing the forest in favor of range-use purposes. In this general context of behavior and attitudes, the agricultural interests seemed highly satisfied with their timber sales; none expressed dissatisfaction with the logging or with the buyer's performance.

Miscellaneous interests as a group includes persons holding land for recreation, residence, business, or for various other purposes that cannot be properly classified as timber or agricultural. Several mining interests with substantial timber holdings were included in this group. But in general these ownerships were very small, over four-fifths being less than 180 acres in size. Nearly two-thirds of the owners lived away from their property, and two-fifths outside the

- Compared to the general pattern, miscellaneous interests more frequently:
- Sold on the basis of verbal arrangements**
- Sold to a buyer who contacted them and initiated the sale**
- Accepted the offer of a single buyer**
- Did not have previous sales experience**
- Sold with knowledge of price**
- Made lump-sum sales**
- Marked timber for cutting, and made light cuts**
- Were dissatisfied with the logging**
- Felt buyer hadn't complied with their agreement.**

region. Only a fifth of the group sold timber during the study period, and of these slightly more than half had previous marketing experience.

Because of the fairly diverse makeup of this group, marketing practices tended to consist of both desirable and undesirable elements. For example, contact with the market was very limited and most sales were initiated by the buyer. Price was established by the offer of a single buyer twice as often as was true of timber interests. However, a large proportion of the sellers had knowledge of current prices, and marking timber for cutting was more common. These two characteristics were due mainly to the presence of several larger properties which contained considerable timber holdings, and where interest in marketing was evident. For the most part the owners were in an unfavorable position in the market, lacking the contact and knowledge required to make satisfactory sales. As a result, a larger proportion of sellers were unhappy with their sales than was the general case.

Among resident and nonresident owners. Because of closer contact and greater familiarity with the market, resident owners tended to sell timber under informal arrangements. Verbal agreements were common, and in a third of

the sales the buyer was a personal friend. The latter practice may be related to the more frequent establishment of price based on a single buyer's offer.

Nonresident owners tended to make more formal arrangements in marketing timber, probably because they were not as familiar with the market and because they are in a poorer position to supervise the sale personally. Nonresident owners living inside the region had greater familiarity with the market than those living outside. However, the latter received assistance more frequently than others. These owners also lacked knowledge of current prices and often were unhappy with the results of their timber sales. A buyer's offer was the main factor prompting the sales made by nonresidents living outside the region.

Compared to the general pattern, resident owners more frequently:

- Made verbal agreements**
- Knew the buyer**
- Selected buyer on basis of personal friendship**
- Accepted the offer of a single buyer**
- Had knowledge of price**
- Sold without outside assistance but knew it was available**
- Sold on scale.**

Nonresident owners living in the region more frequently:

- Entered jointly written contracts or provided their own**
- Knew the buyer**
- Made lump-sum sales**
- Had previous marketing experience.**

Nonresident owners living outside the region more frequently:

- Entered jointly written contracts or provided their own**
- Sold to a buyer who contacted them and initiated the sale**
- Did not have knowledge of price**
- Made lump-sum sales**
- Received outside assistance**
- Considered logging poor.**

Purchasing procedures of timber buyers

Several points on the buyer side of the market and timber-purchasing practices deserve further mention.

Considering the manner in which small-forest timber is marketed, the function of timber operators is clearly of major importance. Commonly the buyer seeks the seller rather than the reverse. Thus a chief function of timber buyers is the assembling of timber from numerous small holdings that might not otherwise reach the market. This means that the opportunities of forest owners to market timber are largely determined by the activity of timber buyers. In general, owners sit on the sidelines, passive participants in the events that finally bring their timber into the market. The activities of buyers, in turn, respond to market-demand conditions for lumber and sawlogs, and their collective quest for timber expands and contracts as new buyers come, old ones drop out, and existing buyers expand or contract their purchases. Thus the sales activity on small forests is guided largely by enterprising buyers rather than by direct actions on the part of timber holders.

Buyers' methods for locating available timber are determined by the character of the market. Since there is no organized market through which to locate owners who have salable timber and who are willing to sell, the buyer essentially becomes a "prospector" searching out potential sellers through various "hit or miss" procedures. This was described by one mill operator and timber buyer as "an art in itself." Most commonly the buyer simply searches a given area for merchantable timber, identifies the owner or owners through local inquiry or examination of the tax rolls, and then makes an offer to buy the timber. Until the timber owner is contacted, the buyer has little way of knowing whether the owner is interested in selling. The success of the contact may hinge on the

buyer's persuasiveness. Undoubtedly the efficiency of these activities depends on the buyer's general familiarity with the local timber-supply situation.

Once a sale has been negotiated, the relationship thus established may continue and result in subsequent sales. As has been noted, previous business relationships accounted for one-sixth of the methods of finding the buyer. The buyer may also learn of an owner interested in selling timber through a mutual friend or neighbor. Once a sale in a particular locality is completed and the logging started, the operator frequently contacts the owners of adjacent or nearby forest properties with offers to purchase their timber "while he is operating in the area." In the same way, the owner may learn of the buyer in the neighborhood and make him an offer to sell. A few sellers gave this situation as both the reason for selling and for selecting the buyer.

In these marketing activities the initial processors of sawlogs play a role not yet determined. With the measurement of products often being accomplished by the mill, the effects of scaling practices of these processors bear on timber operators selling logs as well as on timberland owners. Also, mill operators provide credit facilities to buyers who do not possess the capital required to buy stumpage, and through these arrangements may affect activities of timber operators and influence buying policies and practices.

Prices and price-determining factors

Price Levels and Trends. The average prices paid forest owners over the period 1953 to 1958 for young-growth ponderosa pine stumpage are shown in table 12. Not included are data on old-growth sales, and sales of Douglas-fir, white fir, and incense-cedar, because too few data were obtained to permit presentation. In most, but not all, sales of

Table 12. Prices paid for private second-growth ponderosa pine stumpage, Central Sierra Nevada Region, 1953-1958

Year	Number of sales	Range in price	Average price
			Per MBM
1953.....	6	\$ 3-16	\$10.00
1954.....	4	7-10	8.00
1955.....	6	6-18	12.70
1956.....	4	8-14	13.40
1957.....	4	10-11	10.50
1958.....	8	10-22	12.50

stumpage these four species were differentiated for purposes of payment.

Although average prices over the period have moved in the range of \$8 to \$13, for five of the six years they moved in the narrower range of \$10 to \$13. In four of the six years they averaged above \$10. A moderate upward trend in average price is evident, with upward and downward movements generally following movements in output (figure 2, page 17).

The variability in stumpage prices, as indicated by the range of prices, is striking; it is especially pronounced in 1953 when the highest price reported was five times the lowest. With reported prices varying so widely average prices, or "the going rate," become of doubtful meaning.

Marketing practices affecting price. The price received by the owner of timberland is the result not only of the interaction of supply and demand but also of a whole complex of other factors. Often the price is related to the efficiency of the marketing practices used. The following four case examples may help point out some of the factors that determine prices.

Case examples on pricing. The four sales, all of young-growth ponderosa pine, were made in 1953 on the basis of

scaled volume, and stipulated that the timber be cut immediately; one or two sawmills were located at about the same distance from each of the four properties. Despite these similarities the prices received from the sales varied greatly—\$3, \$4, \$16, and \$20 per thousand board feet.

The seller receiving the lowest price was a rancher with 1,800 acres of land, 120 acres of which was medium-stocked pine forest. The ranch was located in the upper foothills on moderately sloping ground. Against the advice of a forester, the rancher wished to clear the timber from the 120 acres and convert it to grass, believing this would be the land's most economical use. He sold to a buyer who had contacted him and who was the only buyer available. The price was that offered by the buyer, who made a verbal agreement to clearcut the sale area. The price paid was of secondary interest to the land owner, whose chief objective was to clear the ground. Later, the operator quit logging, and the owner agreed with a second buyer to exchange the timber for having the ground cleared.

The recipient of the second-lowest price was a widowed housewife who owned 66 acres of lightly stocked pine forest on moderately sloping ground in the upper foothills. She was contacted by the buyer, who offered to purchase the timber and who was the only buyer known to her. Opportunity and the intent to "get the money out of it" were the primary reasons for selling. The price was that offered by the buyer, and the terms of sale were agreed to verbally; they included a promise by the buyer to "fix up the roads" and to pile and burn the slash. The seller had some knowledge of prices through a friend, who professed information on "what others were getting." The owner did not have any assistance in making the sale, nor did she know that assistance was available. Cutting was based on a 22-inch diameter limit. In the end the buyer neither di

the road work which had been agreed upon and which was considered in the price, nor did he dispose of the slash, and the seller was unhappy about the outcome of the sale.

Strikingly different was the third case in which the owner received a price of \$16. Here again the owner was a widowed housewife. The property included 100 acres of lightly stocked young-growth timber on moderately sloping ground, and some years before had been certified as a Western Pine Tree Farm although the owner considered it primarily a recreational property. Since the property was to be sold, the owner wished to cut the timber as she believed this would not decrease the sale value of the property. An offer was received from a mill operator who had heard the timber was to be sold. While his offer was being considered, a forester advised the owner to consider the proposed contract carefully since it would allow all trees over 18 inches d.b.h. to be cut. Later the owner was contacted by a second buyer, who learned of the potential sale through information provided by the forester. The second buyer offered the same price, agreed to cut only marked trees, and to use mules to remove the logs. Marking was done by a friend, also a forester. Under a written contract provided by the buyer, over 600,000 board feet were cut on the basis of an improvement marking, and the seller was very pleased with the sale.

The highest price of \$20 was received by a timber-holding individual who had just sold a sawmill business, and who at the time managed a small business and farm. The property was 710 acres of heavily stocked timber on steep ground. In selling, the owner's purposes was to harvest timber he considered ready for cutting. Two known buyers who were considered reliable were contacted and asked to make offers. There was no competitive bidding, but each knew the other was making an offer, and the seller

finally selected the buyer making the highest offer. Cutting was done on the basis of the diameter limit established by the district forest practice rules under a contract drawn up by the seller's attorney.

These four sales, in which the prices received varied considerably, illustrate the numerous factors that may influence price formation. These four case histories show the effects of varying interest in timber marketing, some of the alternative methods available to the owner, and the possibility of increasing income from timber through better marketing. They demonstrate that good marketing requires a whole set of practices and procedures. The following analysis of the relationship between single marketing practices and price should be considered within this broader framework of the entire marketing pattern.

Factors Affecting Price. Certain marketing practices and factors were found to be associated with higher prices: taken together, they suggest a pattern of efficient marketing that would tend to increase sale income. The factors shown in table 14 are only those in which price differences were found to be statistically significant. In interpreting the table it should be kept in mind that price is the result of many related factors; it was not possible to "net out" the effects of other factors on the price associated with a single factor.

The pattern of efficient marketing entails market knowledge of both buyers and price, technical assistance, use of written contracts, and inspection of the sale. Knowledge of the buyer where he was selected on the basis of personal friendship, previous business relationship, or good reputation was associated with higher average price than instances in which the buyer was the only one known. Obviously price factors must be important in these cases, although owners gave nonmonetary reasons for

Table 13. Price-determining factors in sales of ponderosa pine second-growth stumpage, Central Sierra Nevada Region, 1953-1958

Price determining factor or practice	Number of sales	Average price MBM*
Reasons for selecting the buyer		
Personal or business relationship, and good reputation.....	13	\$ 11.90
Only buyer known.....	10	7.70
Method of determining price		
Highest offer, seller's asking price, negotiated price.....	14	\$ 12.80
Single buyer's offer.....	17	8.30
Seller's knowledge of price		
Had knowledge.....	24	\$ 10.80
No knowledge.....	8	9.00
Type of contract		
Written.....	18	\$ 11.40
Verbal.....	15	9.10
Outside assistance		
Yes.....	9	\$ 13.80
No.....	27	9.70
Sale inspection		
Yes.....	22	\$ 11.20
No.....	10	8.40
Basis for cutting		
Diameter limit.....	17	\$ 10.20
Buyer's choice or all merchantable trees.....	10	8.60

* Prices significantly different at 5 per cent level.

selecting the buyer. These findings show that in selecting the buyer it is not wise to sell to the only buyer known. Similarly, accepting the offer of a single buyer resulted in a lower price than when the price was determined by other methods.

Several factors associated with higher prices were probably related to the seller's interest in the sale rather than being price determining in themselves. Owners agreeing to verbal contracts may be less interested in the sale and therefore inclined to use inefficient methods of marketing. This would also tend to be true in cases where the seller had not bothered to check on the logging, and in

instances where the basis for cutting was the buyer's choice or included all merchantable trees.

A number of factors usually thought to be related to prices did not show significant differences. The amount of timber sold, length of log haul, type of cutting, and experience of the seller were not significantly related to the price received.

Why small-forest owners don't sell

Two-thirds of the owners in the survey had not made any sales of timber during the period of study. Four-fifths of these were miscellaneous-interest owners, and two-thirds were such owners holding less than 180 acres. Thus those who had not

made sales were mainly very small, non-timber and nonagricultural owners, whose chief purposes in holding land included residential, recreational, mining, or business uses. About three-fifths of the owners indicated they had salable timber on their land. These were questioned about their opportunity or efforts to market timber and about their reasons for not selling.

Primarily because of the initiative of buyers, the majority of the owners had at least one opportunity to sell their timber. Nearly two-thirds had been sought out by a buyer who had made an offer, and half of these had received two or more offers. Only two of the owners had made an independent effort to locate a buyer.

These findings show that the majority of owners chose not to sell timber rather than lacked a chance to do so. The various reasons for withholding timber from sale are listed below for 53 small-forest ownerships.

ATTITUDE TOWARD TIMBER SALES	PER CENT OF OWNERS
Believes cutting would conflict with other land uses	47
Management plans call for deferral of cutting	22
Salable volume too small to bother with	15
Holding for own use	4
Prices too low	2
Logging practice standards too low	2
Other	8
Total	100

In nearly half the cases the owner's attitude was that cutting timber would

conflict with other land uses of greater value. This feeling was also widely held by owners who had not been contacted by buyers. Characteristically, their ownership interests were residential or recreational. A basic attitude of owners was that cutting would result in damage and debris. For some the esthetic value of the trees on their property was greater than the return from their sale. One-fifth of the owners indicated they were holding timber for cutting later, primarily because the timber was not considered ready to be harvested. In a few cases, however, the timber was held as "a bank account" in case of cash needs in the future.

The third most frequently given reason for holding timber from sale was the belief that the amount that could be sold and the return from it would not justify either the effort required or the damage that would result. Some typical responses were "not enough to trouble with," "not enough to warrant tearing up the ground for," and "too much trouble to be worth it." Implicit in these responses, however, is the probability that the owners would have sold had there been a larger amount of timber available.

These findings indicate that about half the nonsale owners with salable timber had in effect withdrawn their timber land from commercial timber production. If the belief is as widely held among owners who did not have salable timber, as is probably the case, then approximately one-third of all sample owners were not interested in forestry possibilities, primarily because such use was believed to be incompatible with other land values.

APPENDIX

Ownership Inventory Procedure

The ownership survey made in 1957 used the line-intercept technique developed by Hasel and Poli (1949) and used by the California Forest and Range Experiment Station in its Forest Survey. The study area was sampled by superimposing a grid of parallel north-south lines on ownership plats in the offices of county assessors. A 2.2-mile spacing between intercepts was used in the western half of the area where a broken pattern of small private ownerships prevailed, and a 3.3-mile spacing in the national forest areas of the eastern half. Each ownership touched by an intercept line was identified as to the name of the owner, address, size of ownership, and type of ownership. The total number of private ownerships was estimated from this sample by the use of expansion factors based on the probability of an ownership of a certain size being touched by the line intercept. Where 2.2-mile spacing was used, all properties 1,600 acres and larger were theoretically included in the sample, as properties this size could not escape being touched; where 3.3-mile spacing was applied, all properties 2,600 acres and larger were theoretically included.

In 1952 the California Forest and Range Experiment Station delineated and classified land and cover types in Eldorado, Placer, and Nevada counties along the same intercept lines used in the 1957 ownership survey. Areas of these types were estimated by intercept measurements along each of the sample lines. The ratio of total line length to total area provided the factor to convert line segments in inches to area in acres. These data were contained in punch cards when the present study was undertaken, and with the cooperation of the Experiment Station, ownership survey data collected by the School of Forestry were combined with land and cover information for sample lines within the boundaries of the region. Each line segment delineated and classified by the Station was identified as to its ownership. Then the estimate of areas in the various ownership classes was obtained by summing with card-tabulating equipment the area of each land type identified with an ownership class. In effect, the proportion of line length through an ownership class to the total area was taken as an estimate of the area in the class. A comparison of the sample with the estimated population is provided, as follows:

	SAMPLE	ESTIMATED	PER CENT
		TOTAL	SAMPLE
Number of ownerships	885	6,080	14.6
Land area	567,706	908,121	62.5

Marketing Sampling Method

In the ownership study each owner whose property was touched by a line intercept was designated as being either a commercial or noncommercial forest-land owner. On the basis of this sample, it was estimated that there were 5,023 private commercial forest-land owners with less than 5,000 acres. Financial and time considerations indicated that about 200 of these owners could be interviewed. The population was divided into strata on the basis of size of holdings, and a stratified random sample of 200 owners was drawn from an owner address list, with the number of sample owners in each size class being determined as follows:

$$\text{Number of sample owners in size class} = \frac{200 \times \text{per cent of estimated population in size class}}{2} + \frac{200 \times \text{per cent of estimated total land area in size class}}{2}$$

This method gave equal weight to the proportion of owners and the proportion of area in each size class. If weighting had been by proportion of owners alone, there would have been little representation of the larger holdings under 5,000 acres, since half of the sample would have been drawn from owners with less than 40 acres. Weighting by proportion of area would have drawn only 5.5 per cent of the sample from holdings under 40 acres, a class which included one-half of the population.

Because of difficulties in locating owners and other delays, the final sample consisted of 160 owners instead of the 200 originally planned. These owners were distributed among the size classes approximately as in the planned sample.

Adequacy of Sample Size

Marketing schedules were obtained on 65 stumpage sales. The adequacy of these questionnaires for purposes of providing reliable marketing information was tested with The Cumulative Frequency Method (Brown, 1955). This was done by selecting two high frequency answers and two low frequency answers, dividing the questionnaires into three groups of 16 and one group of 17 questionnaires, and tabulating the

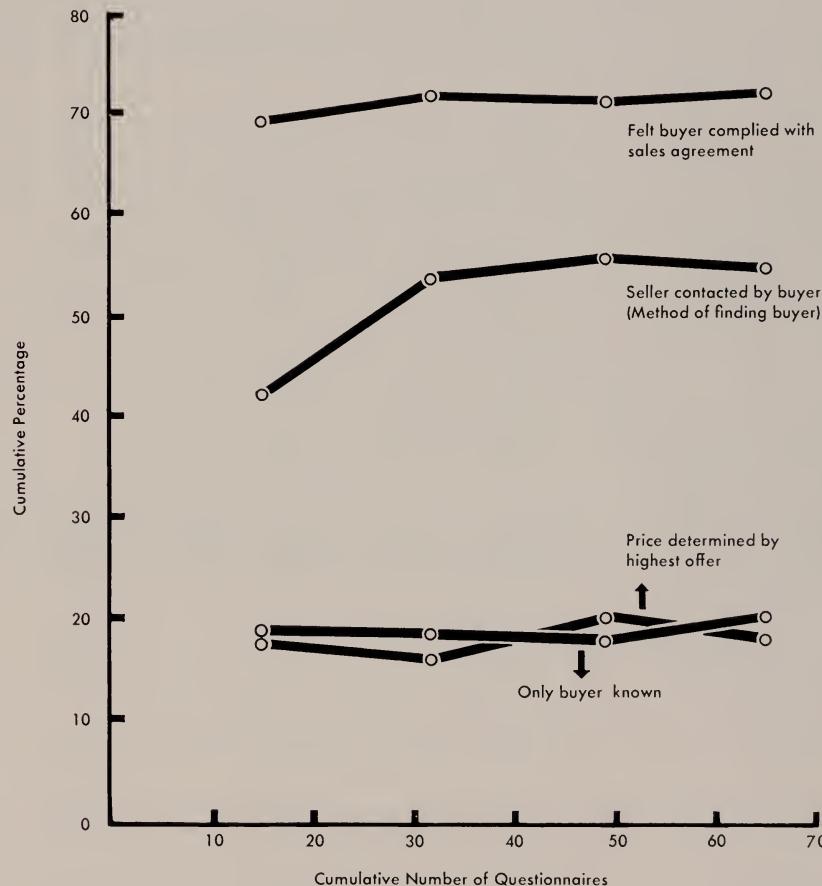


Fig. 9. Chart of cumulative frequencies used in testing marketing sample for statistical reliability.

occurrence of each answer in each of the four groups. The reliability of the sample is measured by the stability of the percentage of occurrence as it accumulates with the addition of each group, and is shown graphically on page 57 for the four test questions. Additional schedules did not change the cumulative frequency of occurrence of high frequency questions appreciably after 32 questionnaires were tabulated. Low frequency answers show less stability, but the sample of 66 questionnaires is sufficient to provide reasonably reliable statistical information.

Appendix Table 1. Persons gainfully employed, total for El Dorado, Nevada, and Placer counties, 1930, 1940, and 1950

	1930		1940		1950	
	Number	Per cent	Number	Per cent	Number	Per cent
Basic Industries						
Agriculture.....	4,892	26	3,211	16	3,441	13
Forestry and fisheries.....	457	3	130	1	180	1
Mining.....	2,008	11	4,139	20	1,141	4
Manufacturing						
Lumber, wood products, and furniture.....	405	2	1,105	5	2,119	8
Food processing.....	134	1	170	1	178	1
Printing and publishing.....	242	1	117	1	165	1
All other manufactures	2,516	14	498	2	754	3
Subtotal	10,654	58	9,370	46	7,978	31
Service Industries						
Wholesale, retail trade.....	1,819	10	2,853	14	4,583	18
Business, personal, pro- fessional.....	2,424	13	3,292	16	5,479	20
Construction.....	302	2	1,349	7	1,867	7
Transportation, utilities.....	2,458	13	2,438	12	3,985	15
Finance, insurance, real estate.....	221	1	299	1	559	2
Public administration.....	238	1	653	3	1,492	6
Other services.....	...	...	...	...	...	...
Subtotal	7,462	40	10,884	53	17,965	68
Industries not reported.....	394	2	301	1	386	1
Total employed	18,510	100	20,555	100	26,329	100
Total population	43,389		60,620		77,744	

Source: U. S. Department of Commerce, Population Census, 1930, 1940, 1950.

Appendix Table 2. Commodity production of forest products in the Central Sierra Nevada Region, 1947-1957

Year	Number of registrants	Total commodity production	Sawlogs and veneer logs	Pulpwood	Split products	Piling and poles
		million bd. ft.	million bd. ft.	million bd. ft.	thousand bd. ft.	thousand pieces
1947.....	...	348.8	347.9	....	....	8
1948.....	148	325.7	325.5	....	30	..
1949.....	121	280.3	280.0	....	....	..
1950.....	143	388.3	386.8	....	....	14
1951.....	185	474.5	452.6	17.1	2,212	25
1952.....	188	461.2	451.3	9.5	24	3
1953.....	259	475.1	467.3	6.2	694	9
1954.....	312	393.3	384.2	4.1	92	48
1955.....	336	453.4	446.9	3.6	352	22
1956.....	316	444.5	437.1	1.0	137	48
1957.....	276	306.8	301.6	2.1	10	20
1958.....	217	....	....	....	....	..

Based on reports of timber operators at time of registration as compiled by the California Division of Forestry.

Appendix Table 3. Lumber production by species, Central Sierra Nevada Region, 1946, 1951, and 1956

Year	Ponderosa pine	Sugar pine	True firs*	Douglas fir	Cedar	Other species†	Total
Thousand board feet							
1946.....	183,516	35,281	55,019	38,115	14,808	20	326,759
1951.....	155,848	37,920	92,058	52,098	6,146	2,046	346,116
1956.....	134,886	39,031	124,248	63,061	11,049	3,824	376,099

* White fir and California red fir.

† Lodgepole, digger, and western white pines; alder, black and white oaks, walnut, cottonwood, eucalyptus, and Philippine mahogany (imported).

Sources: May, R., et al. California Forest & Range Experiment Station Forest Research Note No. 55, Table 5; Forest Survey Release No. 17, Table 5; Forest Survey Release No. 30, Table 6.

Appendix Table 4. Number of ownerships and area of privately owned rural land by type of ownership, Central Sierra Nevada Region, 1957

Type of ownership	Ownership		Total land area		Noncommercial forest land		Nonforest land
	Number	Per cent	Thousand acres	Per cent	Thousand acres	Per cent	
Timber-operating company.....	14	0.2	165	18.2	152	11	2
Timber-holding company.....	23	0.4	110	12.1	58	46	6
Timber-operating individual.....	18	0.3	4	0.5	3	1	*
Timber-holding individual.....	578	9.5	160	17.6	124	29	7
Range-livestock-farming company.....	...	...	...	...	...	...	...
Range-livestock-farming individual.....	608	10.0	204	22.5	95	80	29
Other farmers.....	312	5.1	23	2.5	15	3	5
Recreational property owners.....	224	3.7	21	2.3	15	4	2
Other classified owners.....	4,289	70.6	220	24.2	155	43	22
Unknown.....	14	0.2	1	0.1	...	1	*
All ownerships.....	6,080	100.0	908	100.0	617	218	73

* Less than 500 acres.

Sources: Forest land areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 5. Number of ownerships and area of privately owned rural land by size of ownership, Central Sierra Nevada Region, 1957

Size of ownership—acres	Ownership		Total land area		Commercial forest land	Noncommercial forest land	Nonforest land
	Number	Per cent	Thousand acres	Per cent			
1-	179	85.3	193	21.3	135	37	21
180-	379	7.1	102	11.2	68	23	11
380-	699	4.6	130	14.3	81	35	14
700-	1,299	1.8	85	9.4	48	28	9
1,300-	2,599	0.8	73	8.0	43	24	6
2,600-	4,999	0.2	58	6.4	42	13	3
5,000-	9,999	2	11	1.2	8	2	1
10,000-19,999	3		33	3.6	26	6	1
20,000-29,999	2	0.2	46	5.1	40	6	*
30,000-49,999	...		...	...	...	...	...
50,000 and over	2		177	19.5	126	44	7
All ownerships	6,080	100.0	908	100.0	617	218	73

* Less than 500 acres.
 Sources: Forest land areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 6. Number of rural landowners by size and type of owner, Central Sierra Nevada Region, 1957. (All land types combined)

Type of ownership	Size of ownership						Number of ownerships			Total
	0-179	180-379	380-699	700-1,299	1,300-2,599	2,600-4,999	5,000-9,999	10,000-19,999	20,000-29,999	
Timber-operating company.....	4	..	..	3	1	1	1	1	2	1
Timber-holding company.....	11	4	..	2	4	1	..	..	..	1
Timber-operating individual.....	11	3	4	..	..	..	..	..	..	..
Timber-holding individual.....	330	135	71	26	12	3	..	1	..	..
Range-livestock-farming company.....	..	..	..	..	..	..	..	..	..	..
Range-livestock-farming individual.....	312	120	91	57	18	9	..	1	..	..
Other farmers.....	283	20	9	..	..	..	..	..	..	..
Recreational property owners.....	191	14	18	..	..	1	..	..	..	..
Other classified owners.....	4,028	132	89	24	14	1	..	..	..	..
Unknown.....	14	..	..	..	..	..	..	..	..	..
Total.....	5,184	428	282	112	49	16	2	3	2	2
										6,080

Appendix Table 7. Area of privately owned rural land by size and type of owner, Central Sierra Nevada Region, 1957. (All land types combined)

Type of ownership	Size of ownership										Total
	0-179	180-379	380-699	700-1,299	1,300-2,599	2,600-4,999	5,000-9,999	10,000-19,999	20,000-29,999	30,000-49,999	
	Thousands of acres										
Timber-operating company.....	1	..	..	4	1	9	4	15	46	..	85
Timber-holding company.....	2	1	..	4	8	3	..	..	..	..	92
Timber-operating individual.....	3	*	1	..	..	..	..	..	..	..	..
Timber-holding individual.....	29	34	34	16	21	12	..	14	..	..	160
Range-livestock-farming company.....	..	..	..	..	..	..	..	..	..	..	..
Range-livestock-farming individual.....	26	31	39	45	30	29	..	4	..	..	204
Other farmers.....	12	5	6	..	..	..	..	..	..	..	23
Recreational property owners.....	7	3	10	..	..	1	..	..	..	..	21
Other classified owners.....	112	28	40	16	13	4	7	..	..	..	220
Unknown.....	1	..	..	..	..	..	..	..	..	..	1
Total.....	193	102	130	85	73	58	11	33	46	..	908
										177	

* Less than 500 acres.

**Appendix Table 8. Number of private rural landowners by type and location
of owner, Central Sierra Nevada Region, 1957**

Location	Owner type						Number of owners	Total
	Timber-operating company	Timber-holding company	Timber-operating individual	Timber-holding individual	Range-livestock-farming company	Range-livestock-farming individual		
Resident*	8	5	18	297	...	388	247	2,806
Nonresident†	6	18	...	272	...	212	65	1,483
Unknown	...	...	...	9	...	8	...	...
Total	14	23	18	578	...	608	312	4,289
Nonresidents								
Central Valley	6	10	...	101	...	119	37	4
San Francisco Bay region	...	8	...	82	...	42	17	76
Other northern California	...	...	...	27	...	...	3	5
Southern California	...	...	...	37	...	49	...	140
Outside California	...	...	...	25	...	2	8	37
Total	6	18	...	272	...	212	65	139
								1,483
								9

* A party whose address listed with the county assessor's office is within the regional study area.
 † A party whose address listed with the county assessor's office is outside the regional study area.

Appendix Table 9. Area of privately owned rural land by type and location of owner, Central Sierra Nevada Region, 1957

Location	Owner type						Total
	Timber-operating company	Timber-holding company	Timber-operating individual	Timber-holding individual	Range-livestock-farming company	Range-livestock-farming individual	
Thousands of acres							
Resident†.....	139	4	4	81	...	132	20
Nonresident‡.....	26	106	...	79	...	72	3
Unknown.....	...	...	...	*	...	*	...
Total.....	165	110	4	160	...	204	23
Nonresidents							
Central Valley.....	26	10	...	19	...	52	1
San Francisco Bay region.....	96	...	...	32	...	10	1
Other northern California.....	...	...	...	7	...	1	1
Southern California.....	...	...	...	12	...	7	...
Outside California.....	...	...	...	9	...	2	*
Total.....	26	106	...	79	...	72	3

* Less than 500 acres.

† A party whose address listed with the county assessor's office is within the regional study area.

‡ A party whose address listed with the county assessor's office is outside the regional study area.

Appendix Table 10. Number of ownerships and area of privately owned land by location of owner, Central Sierra Nevada Region, 1957

Location	Ownership		Total land area		Noncommercial forest land		Nonforest land
	Number	Per cent	Thousand acres	Per cent	Thousand acres		Thousand acres
					Commercial forest land	Noncommercial forest land	
Resident [†]	3,854	63.4	507	55.8	355	103	49
Nonresident [‡]	2,204	36.3	400	44.1	262	114	24
Unknown.....	22	0.3	1	0.1	*	1	*
Total.....	6,080	100.0	908	100.0	617	218	73
 Nonresidents							
Central Valley.....	787	12.9	136	15.0	98	33	5
San Francisco Bay region.....	808	13.3	192	21.2	115	64	13
Other northern California.....	177	3.0	14	1.5	11	2	1
Southern California.....	266	4.4	30	3.3	19	8	3
Outside California.....	166	2.7	28	3.1	19	7	2
Total.....	2,204	36.3	400	44.1	262	114	24

* Less than 500 acres.

[†] A party listed with the county assessor's office is within the regional study area.

[‡] A party whose address listed with the county assessor's office is outside the regional study area.

Sources: Forest land areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 11. Commercial forest land by type of ownership and by timber type, 1957, Central Sierra Nevada Region

Type of ownership	Total		Timber type			
			Pine	Fir	Pine; Douglas fir; fir	Lodgepole pine
	Thousand acres	Per cent	Thousand acres			
Federal†.....	583	46.8	109	50	404	20
State.....	5	0.4	*	..	5	..
County and municipal.....	11	0.9	8	1	2	..
Utilities.....	32	2.6	6	4	22	*
Timber-operating company.....	152	12.2	26	7	119	..
Timber-holding company.....	58	4.6	5	9	38	6
Timber-operating individual.....	3	0.2	1	..	2	..
Timber-holding individual.....	124	9.9	48	2	68	6
Range-livestock-farming company.....	..	..	..	..	..	..
Range-livestock-farming individual.....	95	7.6	76	1	15	3
Other farmers.....	15	1.2	12	..	3	..
Recreational property owners.....	15	1.2	7	2	4	2
Other classified owners.....	155	12.4	111	*	44	..
All ownerships.....	1,248	100.0	409	76	726	37

* Less than 500 acres.

† Principally national forest.

Sources: Timber type areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 12. Privately owned commercial forest land by size of ownership and timber type, Central Sierra Nevada Region, 1957

Size of ownership—acres	Total acreage		Timber type			
			Pine	Fir	Pine; Douglas fir; fir	Lodgepole pine
	Thousand acres	Per cent	Thousand acres			
1- 179.....	135	21.9	100	2	32	1
180- 379.....	68	11.0	51	*	17	*
380- 699.....	81	13.1	51	1	26	3
700- 1,299.....	48	7.8	27	2	19	..
1,300- 2,599.....	43	7.0	14	1	25	3
2,600- 4,999.....	42	6.8	13	2	25	2
5,000- 9,999.....	8	1.3	3	*	5	..
10,000-19,999.....	26	4.2	9	..	15	2
20,000-29,999.....	40	6.5	8	3	29	..
30,000-49,999.....	..	..	..	..	..	..
50,000 and over.....	126	20.4	10	10	100	6
All ownerships.....	617	100.0	286	21	293	17

* Less than 500 acres.

Sources: Timber type areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 13. Commercial forest land by type of ownership and by age class of timber, 1957, Central Sierra Nevada Region

Type of ownership	Total acreage		Age class					Nonstocked
	Thousand acres	Per cent	Old growth		Young growth		Large young growth	
			Old growth	young growth	old growth	young growth	Large young growth	
Federal [†]	583	46.8	3	174	243	83	26	54
State	5	0.4	...	*	1	*	3	1
County and municipal	11	0.9	...	4	2	5	1	3
Public utilities	32	2.6	...	4	9	9	3	7
Timber-operating company	152	12.2	1	42	67	26	7	9
Timber-holding company	58	4.6	1	16	26	5	3	7
Timber-operating individual	3	0.2	...	...	2	1	*	*
Timber-holding individual	124	9.9	...	10	27	45	12	30
Range-livestock-farming company	95	7.6	*	5	15	42	6	27
Range-livestock-farming individual	15	1.2	...	...	*	7	1	7
Other farmers	15	1.2	...	3	3	5	2	2
Recreational property owners	155	12.4	...	2	14	71	15	53
All ownerships	1,248	100.0	5	256	409	299	79	200

* Less than 500 acres.

[†] Principally national forest.

Sources: Forest age class areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 14. Privately owned commercial forest land by size of ownership and by age class of timber, Central Sierra Nevada Region, 1957

Size of ownership—acres	Total acreage Thousand acres	Per cent	Age class					
			Old growth		Young growth-old growth	Large young growth	Small young growth	
			Thousand acres					
1-	179	21.9	*	4	11	61	14	45
180-	379	11.0	..	1	8	30	5	24
380-	699	13.1	..	5	14	28	8	26
700-	1,299	7.8	..	1	9	23	3	12
1,300-	2,599	43	*	4	11	12	3	13
2,600-	4,999	42	6.8	..	7	14	4	3
5,000-	9,999	8	1.3	..	..	1	4	1
10,000-19,999	26	4.2	..	4	9	9	1	3
20,000-29,999	40	6.5	..	14	14	9	1	2
30,000-49,999	..	..	..	..	..	..	..	..
50,000 and over	126	20.4	2	38	63	12	5	6
All ownerships	617	100.0	2	78	154	202	46	135

* Less than 500 acres.

Sources: Forest age class areas from unpublished 1952 vegetation survey by California Forest & Range Experiment Station; ownership areas from 1957 survey by the School of Forestry.

Appendix Table 15. Distribution of 160 sample owners

A. By size of ownership

Size of ownership	Ownerships	Total land area	Commercial forest land
acres	number	acres	acres
0- 39.....	43	692	373
40- 179.....	52	5,174	2,710
180- 379.....	19	5,061	2,248
380- 699.....	21	10,402	4,106
700-1,299.....	14	12,093	6,050
1,300-2,599.....	8	14,053	6,275
2,600-4,999.....	3	9,635	7,156
Totals.....	160	57,110	28,918

B. By type of ownership

Type of ownership	Ownerships	Total land area	Commercial forest land
	number	acres	acres
Timber-holding company.....	2	1,458	1,458
Timber-operating individual.....	1	10	10
Timber-holding individual.....	11	9,435	7,456
Range-livestock-farming company.....	..	.....	.....
Range-livestock-farming individual.....	31	25,926	9,793
Other farmers.....	9	2,681	952
Recreational property owners.....	9	1,671	854
Other classified owners.....	97	15,929	8,395
Totals.....	160	57,110	28,918

C. By residence

Place of residence	Ownerships	Total land area	Commercial forest land
	number	acres	acres
On the property.....	62	15,876	4,933
Nonresident, inside region.....	33	17,362	10,617
Nonresident, outside region.....	65	23,872	13,368
Totals.....	160	57,110	28,918

Appendix Table 15 (continued)**D. By date of acquisition**

Date of acquisition	Ownerships		Total land area		Commercial forest land	
	Number	Per cent	Acres	Per cent	Acres	Per cent
Since 1950.....	70	47.6	20,194	36.4	7,323	25.7
1945 to 1949.....	20	13.6	7,437	12.7	3,861	13.5
Before 1945.....	57	38.8	27,452	50.9	17,334	60.8
Totals*	147	100.0	55,083	100.0	28,518	100.0

* Excludes 13 ownerships for which data were not obtained.

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